DOCUMENTS EXPEDITING PROJECT

FEDERAL SUPPORT OF MEDICAL RESEARCH

REPORT

OF THE

COMMITTEE OF CONSULTANTS ON
MEDICAL RESEARCH

TO THE

SUBCOMMITTEE ON
DEPARTMENTS OF LABOR AND HEALTH, EDUCATION,
AND WELFARE

OF THE

COMMITTEE ON APPROPRIATIONS
UNITED STATES SENATE
EIGHTY-SIXTH CONGRESS
SECOND SESSION

MAY 1960

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Hon. LISTER HILL,

Chairman, Subcommittee on Appropriations for the Departments of Labor, and Health, Education, and Welfare, Committee on Appropriations, U.S. Senate, Washington, D.C.

DEAR SENATOR HILL: The Committee of Consultants on Medical Research, established by your Subcommittee in response to a resolution passed by the Committee on Appropriations of the U.S. Senate on June 23, 1959, was asked "to determine whether the funds provided by the Government for research in dread diseases are sufficient and efficiently spent in the best interests of the research for which they are designated * * *."

The Committee has now completed its review and herewith transmits to you as Chairman of the Senate Appropriations Subcommittee on the Departments of Labor, and Health, Education, and Welfare its final report containing the principal findings and recommendations pertinent to its mission.

In the course of its study the Committee heard testimony presented by more than 100 expert witnesses; it reviewed numerous documents and reports, both published and unpublished, and new information gathered at its request. It reached its judgments after extended discussions by unanimous agreement. A summary of these judgments, and the recommendations based upon them, will be found at the beginning of the report.

The Consultants found the assignment to be both challenging and rewarding. They will be pleased if their report communicates effectively their conclusion that Federal funds provided for medical research, while substantial and efficiently used, are not sufficient for full utilization of the country's medical research potential in the national effort to attain solutions to the problems of serious disease.

The Committee records its appreciation for the complete freedom of action given to it, for the full response by witnesses and resource experts to its requests for information and opinions, and for the devoted and effective services of its staff.

Respectfully submitted.

BOISFEUILLET JONES, *Chairman.*

APRIL 20, 1960.

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ACKNOWLEDGMENTS

In the submission of this report the Committee of Consultants on Medical Research [1] wishes to express sincere appreciation to the Senate Appropriations Subcommittee on the Departments of Labor and Health, Education, and Welfare for giving it complete freedom of action and all possible support in its survey.

Throughout the course of the Committee's activity the most complete cooperation was extended by all Government agencies from which information was requested. The Committee would particularly like to express its gratitude to the administrative staff, the Office of Program Planning and the Division of Research Grants of the National Institutes of Health, and to the Office of Special Studies of the National Science Foundation. The efforts of the Resources Analysis Section of the Office of Program Planning to make valuable and pertinent information available, in some cases before formal publication, were deeply appreciated.

Many individuals and groups outside the Government were extremely helpful and the Committee would especially like to thank Dr. Ward Darley of the Association of American Medical Colleges and the late Dr. Edward Turner and Dr. Walter Wiggins of the American Medical Association for opening their great stores of information for its use.

In the vast amount of material which it reviewed, the Committee found two recent survey reports of exceptional value and will refer to them repeatedly in the pages that follow, namely:

U.S. Department of Health, Education, and Welfare, Office of the Secretary. *The Advancement of Medical Research and Education Through the Department of Health, Education, and Welfare: Final Report of the Secretary's Consultants on Medical Research and Education, 1958* (The Bayne-Jones Report).

U.S. Department of Health, Education, and Welfare, Public Health Service. *Physicians for a Growing America: Report of the Surgeon General's Consultant Group on Medical Education, 1959* (The Bane Report).

The Committee wishes to give high praise to these survey committees and regrets that many of their recommendations have not yet been implemented. It hopes that the additional endorsement given to some of their recommendations in the present report will confer enough added impetus to be translated into concrete action.

If the recommendations of these two reports and those included in the following pages are carried out the Committee feels confident that the progress in medical research in the years ahead will assure the fulfillment of the health goals of our people.

[1] The terms "medical research" and "medical education and training" are broadly interpreted by the Committee to include educational, research, and research training activities in such institutions as schools of medicine, osteopathy, dentistry, and public health, universities with strong programs in the life sciences, independent hospitals, and research institutes. The term "practice of medicine" is intended to include the practice of dentistry and osteopathy.

SUMMARY

The United States today is experiencing the development of a medical research program of a vigor and productivity unparalleled in history. This phenomenon is a typically American enterprise combining private and governmental efforts in successful collaboration. As a result, our pool of trained manpower has been greatly expanded; we have developed many well-equipped laboratories, and our background of knowledge as a basis for further progress has been enormously enriched. Most important, Federal funds have been provided without interference with the freedom of the research and teaching institutions or of the individual investigators.

The great advances already forthcoming from this program justify the expectation that, through medical research, the span of useful, enjoyable life can be still further lengthened, and that the benefit to society of longer, healthier, and more productive lives will be far greater than the cost of the research required to reach that goal.

The magnitude of the problems of disease and disability confronting our people today is still so vast as to be beyond the comprehension of most of us. The nature of our enemies has shifted from the communicable diseases to the chronic disorders, and especially to cardiovascular-renal disease, cancer, mental illness, and other problems predominating in the older age group which has been greatly increased in numbers. Aside from the unhappiness and tragedy represented in the incidence rates of these conditions, we should remember that the present cost of disease and disability to our nation is estimated as at least $35 billion a year. Only through medical research and the application of its findings can these losses be reduced.

The people of the United States have demonstrated through their Congress and through their private voluntary contributions that they consider it essential and urgent to support a determined attack on the dread diseases. Such an attack will require the full mobilization of the Nation's potential for medical research. This can only be achieved with substantial financial support, a major part of it from the Federal Government.

The Committee of Consultants on Medical Research was constituted in response to a resolution passed by the Committee on Appropriations of the U.S. Senate on June 23, 1959. It was asked "to determine whether the funds provided by the Government for research in dread diseases are sufficient and efficiently spent in the best interests of the research for which they were designated * * * (and to) take into account the facilities, the experts, the laboratories, the availability of private funds and all other factors including the possible impact which the recruitment of those engaged in research enter into such a study of research efforts."

The findings and recommendations of this Committee are presented in the following report and are summarized briefly below.

I. Adequacy of Federal Support of Medical Research

The funds provided by the Federal Government in support of medical research over the past 15 years have been substantial. Although generously increased in recent years, they have not kept pace with new opportunities in research which have developed, largely as a result of the very advances which the funds expended in the past have generated. They are still not sufficient to assure the full utilization of the Nation's present potential for an attack on dread disease, and the current level of support is far from adequate to permit the great advances essential for the future.

II. Effectiveness of Utilization of Federal Funds Appropriated for Medical Research

Considering the Federal research program as a whole, the funds appropriated by the Congress for the support of research on major disease problems have been expended by Federal agencies with remarkable efficiency. The National Institutes of Health, which Congress has made its principal instrument for the disbursement of funds for medical research, has developed an extremely successful system for review and approval of applications for research grants, training grants, and fellowships. This plan, relying on close supervision of outstanding scientists, has assured consistently high standards for the research supported, gained the confidence of the scientific community and maintained the traditional freedom of both institutions and investigators.

In the expanding program of medical research which the Committee foresees for the future, new methods must be developed for the administration of funds which will continue to preserve the freedom of the investigator and the integrity of the educational and research institutions, and which will be able to deal with new organizational patterns of research to be described subsequently. In large new programs the Congress should be encouraged to authorize funds on a 2-year basis (or more) to allow time for effective planning and the recruitment of appropriate personnel.

III. Impact of Expanding Federal Program

A. EFFECT ON MEDICAL SCHOOLS

The impact of the Federal program in support of medical research on medical teaching has been extremely beneficial and has been largely responsible for an improvement in standards of medical training. The number of teachers has increased and the research facilities of the institutions have been greatly improved. The proportion of teachers participating in research has risen, medical students have been inspired by the atmosphere of inquiry created by the research in progress, and the medical graduate of today has a much better conception of the possibilities and practical contributions of research than did the graduate of a generation ago.

However, the expanded program has posed problems for the medical schools, chief of which is the mounting cost to the institutions of the research undertaken by its staff. On all research grants supported through the National Institutes of Health the payment of the costs of research incidental to its performance is limited to 15 percent of the total direct costs. This is not sufficient in most institutions, and the deficit has to be met by diverting funds from other important needs. The National Institutes of Health is the only Federal agency making research grants which is under such restriction. The Committee recommends strongly that this unfair discrimination be remedied by permitting the National Institutes of Health, like other Federal agencies, to pay either the full costs of research as determined by a cost analysis formula, or a fixed flat rate, whichever is lower. The Committee believes that at the present time the flat rate should be set at 25 percent of the total direct costs.

Other methods recommended for strengthening the medical schools include institutional grants, the construction of health educational facilities, an increase in training programs, and the provision of additional stable career opportunities in academic medicine.

B. EFFECT ON MEDICAL PRACTICE

The expanding program of medical research has made tremendous contributions to medical practice in terms of new knowledge, techniques, and methods of treatment and has been a prime factor in raising the standard of medical care to the highest level ever achieved. Through the findings of medical research, the doctor of today has been equipped with powerful ammunition for the treatment of disease—ammunition which has enormously magnified his effectiveness as compared with that of the doctor of a generation ago.

Moreover, some of the training programs of the National Institutes of Health have trained psychiatrists, neurologists, ophthalmologists, and other specialists who were previously in short supply, so that our population is more adequately supplied with physicians competent in these specialties than ever before.

These gains have more than compensated for a limited diversion of physicians from practice to research and teaching and for the developing quantitative shortage of medical manpower.

C. EFFECT ON NON-FEDERAL SOURCES OF SUPPORT

The Federal program has served as a stimulus rather than a deterrent to non-Federal sources of financial support of medical research. The annual contributions of the foundations, the voluntary health agencies, industry, and the States have all increased markedly in the past 15 years. The great diffusion of health knowledge to the public from both Federal and non-Federal programs has been mutually beneficial, and the greater consciousness of the needs of medical research on the part of the public has resulted in both an increase in support of medical research through the foundations and voluntary health agencies and an increased determination on the part of the taxpayers to support medical research through their tax dollars. In addition, the matching fund programs of the Hill-Burton hospitals and of health research facilities construction have served as a stimulus to non-Federal sources to contribute still more generously.

IV. Status of Medical Manpower

A. NUMBER OF PHYSICIANS

The United States, with a rapidly expanding population and an increasing demand for medical service, faces a growing shortage of physicians and dentists. The Committee recommends strongly that the measures outlined in the Bane Report be implemented at the earliest possible date, namely: (1) the expansion of existing schools to the maximum extent compatible with maintenance of high standards of training; (2) the establishment of 2-year schools to fill the vacancies existing in the third-year classes of our present schools because of dropouts in the first and second years, and (3) the construction of approximately 20 new 4-year medical schools and 22 new dental schools. It should be emphasized that, no matter what measures we take today, the number of graduates through 1963 is fixed by the number now enrolled.

Because of the long lead time required to build a medical school and graduate its first class, the Committee strongly recommends support of pending legislation which proposes that the Health Research Facilities Construction Act be amended to include the construction of health educational facilities, and that funds be authorized over a 10-year period at an initial rate of $60 million per year to support the Federal share of a long-range program of renovation, expansion, and new construction of schools of medicine, dentistry, and public health.

B. RECRUITMENT OF PHYSICIANS

There has been a decrease in the number of young people choosing medicine as a career at a time when the number of college graduates is increasing. This is a serious development if we are to increase the number of our medical graduates by 3,600 per year by 1975 as recommended in the Bane Report. The

most important reasons for this apparent loss in popularity of medicine are the great length and high cost of medical training. The Federal Government is extending a large measure of fellowship support to every field of higher education in the sciences except medicine. Many young men and women who might have applied to medical schools have therefore taken the shorter and less expensive route of a career in the basic sciences, the number enrolled having risen markedly in the past 5 years. This situation should be remedied by an intensive information program at the high school and college levels to acquaint young people with the challenge, opportunities, and rewards of a career in medicine, and by a strong Federal program to supplement private and State sources of funds in providing extensive scholarship support for medical students.

C. MANPOWER FOR RESEARCH

The Committee disagrees emphatically with those who hold that further expansion of the medical research effort of the country is impossible because of the shortage of manpower. Physicians and dentists constitute less than half of the professional personnel engaged in research. Since the number of Ph.D. graduates is increasing rapidly and the number of supporting personnel is almost limitless, and since modern equipment and techniques have enormously magnified the productivity of the individual investigator, the present relative shortage of physicians and dentists is not a limiting factor on the expansion of our research effort. The manpower is available for a remarkable growth of the present program.

V. Government Agencies Other Than the Department of Health, Education, and Welfare

Government agencies have made distinguished contributions to our store of medical knowledge, and the provision of adequate support for their programs of medical research is basic both to their special research needs and to a full national medical research effort. This applies particularly to the Public Health Service and its research arm, the National Institutes of Health. It also applies to the Department of Defense, Veterans' Administration, National Science Foundation, and the Atomic Energy Commission.

The Committee finds that there are excellent research opportunities in the hospitals of the three branches of the armed services and of the Veterans' Administration which are not being fully utilized because of lack of funds. The Committee considers this most unfortunate because a strong research program in a hospital has been found to be one of the most potent stimuli to the staff in maintaining the highest standard of medical care. Moreover, these hospitals can make an important contribution to research on major disease problems.

The most serious deficiency of the medical research programs of the Department of Defense at present is in the special medical research institutes of the services. Here the level budgets of recent years and the rising costs of research caused by inflation have forced a reduction in personnel and have pre-

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vented the purchase of needed supplies and equipment until the research productivity of these institutes is being gradually reduced. Adequately supported, these fine facilities, built at the taxpayers' expense, would be capable of making a tremendous contribution to the special research needs of the respective services, as well as to research on serious disease.

The Committee has therefore recommended a substantial increase in the medical research budgets of the three armed services and the Veterans' Administration for fiscal year 1961.

VI. Department of Health, Education, and Welfare, Public Health Service

The Committee has refrained from specific recommendations regarding the divisions of the Department of Health, Education, and Welfare other than the National Institutes of Health. The Public Health Service has just completed a study aimed at reorganization of its administrative structure in order to centralize closely related activities and prevent overlapping functions. The Committee hopes that the new pattern will permit more effective coordination of research and policy in the fields of environmental health and problems of aging.

VII. The National Institutes of Health

After reviewing extensively the organization and programs of the National Institutes of Health, the Committee wishes to add its praise to that of all other professional groups which have studied this agency, and to express confidence that the remarkably dedicated and competent staff will meet the challenge of the larger programs in the future with the same wisdom and flexibility it has shown in the past.

The greatest difficulty of the National Institutes of Health at the present time is in regard to personnel. In the top administrative and scientific posts there are today many gaps which it has been impossible to fill with competent people. This is chiefly because the salary structure for such positions is no longer in a favorable competitive position with medical schools and industry, and because the manpower base of the Public Health Service is too small to provide enough individuals of high competence from within the commissioned corps to staff the Bureau of Medical Services, the Bureau of State Services, the Office of the Surgeon General, and the National Institutes of Health.

The Committee has therefore recommended (1) an increase in the salary ceiling for specially qualified scientific and other professional personnel authorized by section 208(g) of the Public Health Service Act and in the number of these positions allotted to the National Institutes of Health; (2) that a larger proportion of the top-ranking personnel be recruited from outside the Public Health Service; and (3) that section 214 of the Public Health Service Act be amended to permit assignment of a limited number of commissioned officers to the civil service system.

The second greatest requirement is for more office space to permit all units of the National Institutes of Health at present dispersed in various distant office buildings to return to the campus in Bethesda where they can carry out their duties more effectively in collaboration with the rest of the National Institutes of Health staff.

Other space needs include a building for the intramural programs of the National Institute of Neurological Diseases and Blindness and the National Institute of Mental Health, a physical biology building, and development of the animal farm.

Of special interest is the urgent need for an international conference center which would provide facilities for holding multilingual conferences and working seminars in the field of medical research. Such a building would serve as a symbol of the role the Committee believes the National Institutes of Health should play in international medical affairs and would greatly aid such activities.

Under problems of organization, the Committee has recommended institute status for the Division of General Medical Sciences and a special council separate from the National Advisory Health Council.

Among the administrative patterns which will be needed for the larger programs of the future, the Committee has recommended program grants, institutional grants, a greater allocation of funds to general or categorical clinical research centers and to special resource centers, and a greater use of collaborative programs in situations in which these are clearly indicated.

VIII. Projections

The mobilization of the Nation's medical research potential for a determined attack on the problems of disease and disability will require the full utilization of all research resources available.

In the case of the armed services and the Veterans' Administration, more generous appropriations will permit the development of vigorous research programs in those hospitals in which they are now inadequate or lacking, and the realization of the great opportunities for major research contributions in the medical research institutes of the services.

The Atomic Energy Commission should be given the full support required to carry out its research mission in the field of radiation biology and the prevention and treatment of radiation damage and sickness in man.

The National Science Foundation should receive increased appropriations to safeguard the area of basic research which, by greatly augmenting our store of knowledge, will provide a base from which many new avenues of research will open, some inevitably leading to valuable applications in medicine. . The important programs supported by the National Science Foundation to improve the standards of science teaching in the secondary schools and colleges should be greatly expanded and with enthusiasm. These, more than any other measures, will help in the recruitment of young people into the sciences.

Research pertinent to medicine undertaken in the Department of Agriculture, the National Space Agency, and the Food and Drug Administration

must not be neglected, and these organizations will be involved in an intensified program of environmental health under the supervision of the Public Health Service. Proposals for a soundly based program in environmental health will soon be forthcoming from the Public Health Service and should receive the most serious consideration and ample support.

PROJECTIONS FOR THE NATIONAL INSTITUTES OF HEALTH

A resolute attack on the dread diseases will require a level of medical research expenditures each year from both Federal and non-Federal sources combined which will be sufficient to give adequate support to all research judged to be of high quality and potential productivity by competent scientific advisers after careful and critical review.

At the rate of growth of research potential indicated by the rising number of new research grant applications of high quality received each year by the National Institutes of Health and by the increasing number of scientists in the research training programs, this attack will require substantial advances in the level of support each year until a reduction becomes possible as these programs are successful in the attack on disease.

In considering the future budgetary needs of the National Institutes of Health the Committee has recognized (1) that major infusions of funds into the Federal program through the National Institutes of Health in the past have been readily absorbed and have resulted in a great increase in research potential and performance, and (2) that the National Institutes of Health staff has shown great ability to administer wisely the funds entrusted to it and great ingenuity and flexibility in adapting administrative patterns to changing needs.

The Committee has divided its consideration of the future requirements of the National Institutes of Health into two sections: (1) the continuation of the present program, and (2) new areas which should receive greater emphasis in the future.

A study of the growth of the National Institutes of Health research grant program in recent years has led the Committee to the conclusion that a conservative estimate of the funds required to support (1) continuing commitments and supplemental requests, (2) the increase in new research grant applications anticipated over the number received in 1960, and (3) a 10 percent increase in the allowance for the costs of research on National Institutes of Health research grants, would total approximately $300 million in fiscal year 1961.

The need for growth in the training grant program to supply the teachers and investigators required for the future is readily apparent. Expansion is essential at various levels: in the hospitals, universities, and research institutes to improve the training for academic careers and to develop certain types of specialists still in short supply; at the predoctoral level to encourage and help support medical students interested in research and academic medicine; and also at the college level to recruit more college students into the medical sciences. The Committee has recommended an increase in the training programs of $57 million to a total of $132 million. This sum would include (1) $14 million for

training grants approved but unpaid in fiscal year 1960, (2) approximately $20 million for expansion of the training programs, and (3) $22.7 million to complete the adjustment of all continuation training grants to a forward notification basis. The last is a nonrecurring item which actually does not represent an additional cost to the Government, but merely advances the time of payment of funds.

For fellowship support an increase of $7.9 million to a total of $22.5 million is recommended: (1) to award fellowships approved, but unpaid in fiscal year 1960; (2) to award new fellowships from a greatly expanded list of applicants; (3) to expand the senior fellowship program to include clinical research; (4) to develop special fellowships in preparation for careers in academic medicine; (5) to increase the number of part-time fellowships which give encouragement and support to research-oriented medical students; and (6) to increase the number of foreign fellowships.

The intramural program is considered to be approaching its optimal size and further growth should be necessary only in the improvement of equipment and research resources and allowance for the rising costs of research. An exception will be the new facilities proposed for the intramural programs of the Institutes of Neurological Diseases and Blindness and Mental Health. The Clinical Center is functioning smoothly and is making outstanding contributions. It is for the most part excellently equipped, but needs some minor additions. A total of $107 million is recommended for all direct operations, $11.4 million more than in fiscal year 1960. Under a separate appropriation $4.4 million is recommended for planning and construction.

One of the Nation's greatest needs at present is for the construction of facilities for both medical research and education. The Committee has recommended that the authorization for health research facilities construction be extended for 5 years after the present expiration date and that the level of appropriation be increased from $30 million to $50 million per year. Furthermore, it has recommended modification of the Health Research Facilities Construction Act to include multipurpose buildings for research and teaching when the teaching activities are closely related to the research performed. Because the need for these facilities is so great in some areas where matching funds are exceptionally difficult to obtain, the Committee has recommended some modification of the 50–50 matching formula in cases of clear justification and urgent need, according to criteria to be established by the National Advisory Council on Health Research Facilities.

There are seven areas or programs in which the Committee believes new or increased emphasis should be placed in the future. These include: (1) general and categorical clinical research centers; (2) primate centers and other animal resources; (3) modernization and supplementation of medical libraries in relation to research; (4) communications research; (5) instrumentation research; (6) increased opportunities for stable academic careers, and (7) increased support of international medical research. The funds required for these programs would represent a further increase of $87,500,000.

In the opinion of the Committee, the most promising and challenging program of those mentioned is the establishment of clinical research centers,

both general and categorical, which will afford opportunity for a multidisciplined attack on disease problems supported by all the necessary skills, techniques, and equipment which modern medicine can provide, and with bed support assured while the patients are under study. These centers will afford the most comprehensive, refined, professionalized and productive study of disease yet imagined. The center concept has been received with great enthusiasm across the country, and there is no question but that it answers a long unmet need which was only brought into focus when funds were made available for a start on this program in the first session of the Congress.

Another type of center strongly advocated by the Committee would be oriented around a specific resource or approach. These would include primate centers and other special animal resources, special facilities for biophysical measurement, computer centers for data processing, biostatistical analysis, communications research and translation, etc. Most of these resource facilities are too costly to be established in relation to an individual project or program grant, or even to a single school or research institute, and it is therefore proposed that these be established on a regional basis with major Federal support. These facilities would be available to qualified investigators from the research institutions of that area, but one institution would carry the main responsibility for administration. Support will have to come primarily from the Federal Government and funds for such centers are included in the additional $87,500,000 recommended by the Committee for areas of special emphasis.

In summary, the Committee believes that the present programs of the National Institutes of Health could use effectively in fiscal year 1961 the sum of $576,500,000 for the orderly growth and development of its present program, or an increase of $176,500,000 over the present year's appropriation. Seven new areas justifying special emphasis would add an additional $87,500,000, making a total budget of $664 million, or $264 million more than the current appropriation of $400 million.

Under separate appropriations the budget should also include $4,400,000 for intramural planning and construction at the National Institutes of Health, $50 million for Health Research Facilities Construction (an increase of $20 million over the present level) and $60 million to initiate a program of Health Educational Facilities Construction.

This level of support would assure the effective utilization of the Nation's present potential for medical research and would allow the growth which the Committee believes necessary. The appropriation of less than the amount suggested may mean a consequent postponement of the time when answers to major disease problems could become available.

In consideration of the growing demand for medical care of our expanding population, the increasing health consciousness of our people and their realization that health can be improved through medical research, and taking into account the growth in knowledge, manpower, and facilities which seems certain to occur, the Committee believes that by 1970 the total support of medical research in the United States will probably require the expenditure of $3

billion, of which more than $2 billion will in all likelihood come from the Federal Government. If the economy grows, as now seems probable, at a rate of 4 to 5 percent per year, we may attain a gross national product of over $775 billion by 1970 and should have the resources to achieve a medical research program of this magnitude.

Thus the Committee concludes that if adequate support is provided, the great advances in the medical sciences which this country has witnessed in the past 60 years, remarkable though they are, will prove to be only the prologue to the great human drama which will be played in the battle against disease and disability during the decades immediately ahead.

INTRODUCTION

The Committee of Consultants began its review of the Federal program in support of medical research with certain assumptions which it found to be sound on the basis of the information obtained and the opinions heard in the course of its survey. These assumptions have now become firmly held convictions.

(1) The health of the people is the greatest resource of the Nation, absolutely vital to its welfare, economy, and security.

(2) The present state of the Nation's health, although greatly improved since the beginning of the century, is still far from the goal of assuring that as many of our population as possible live full and active lives, not warped or blighted by disease. The great tragedies of chronic illness and early death still afflict a tremendous number of our people. New toxic factors in our environment are producing effects which are still only dimly understood, but which seem to be contributing to an increase in the death rates from cardiovascular disease and cancer.

The magnitude of the problem of disease and disability today is difficult to grasp in any form that is meaningful to most of us. Such figures as 900,000 deaths per year from cardiovascular-renal disease and 255,000 deaths from cancer, our main causes of death; or 16 million people disabled by mental and emotional disorders, 16 million by cardiovascular disease and 11 million by arthritis; or the great cost of illness which amounts to a total of at least $35 billion a year, $15 billion in private expenditures, $5 billion in Government expenditures, and $15 billion in disability losses (approximately $195 per year for every man, woman, and child in the United States); still do not register in our minds or our emotions.

These facts have real impact only when someone near to us is stricken by severe disease, and especially when the victim is a child or young adult who has so much to live for and so much to give, or when support of an aged invalid relative saps the vitality and financial strength of a whole family, or when some outstanding national figure of genius and great ability is prevented by early death from continuing his vital contribution to human knowledge and welfare.

(3) The only way we can hope to lessen this burden in the future is through progress in medical research and the practical application of research findings.

(4) Medical research has already proved its value in both humanitarian and economic terms. In the great battle which has been waged against disease and disability since the turn of the century, we have secured a position through medical research in which the life expectancy of a child at birth has been

increased a full 20 years. Moreover, his life is generally far healthier than that of his parents or grandparents, almost completely free of the dangers of communicable disease and the complications of malnutrition, and with the fatalities from accidents reduced through advances in our knowledge and skills in medicine, surgery, and anesthesia. The value of these lives saved is impossible to assess, but each of us who has a child whose life has been preserved by the wonders of modern medicine will be forever grateful.

In economic terms we can recognize that medical research has saved the lives of more than 1,800,000 individuals in the past 15 years. The annual earnings of those whose lives have been prolonged now amount to over $3.6 billion and their tax contribution to the Federal Government to $263 million per year. The control of infectious diseases and the reduction in infant mortality since 1900 have provided the manpower with which we have fought two world wars and the Korean action and have at the same time doubled our population. These savings were accomplished with a relatively small investment of funds in medical research which, we must therefore conclude, pays remarkably high dividends.

(5) The American people have demonstrated through their Congress and through their private voluntary contributions that they consider it essential and urgent to support a determined attack on the dread diseases through research.

(6) The magnitude of that attack and the program of medical research to be supported will be determined by the degree of urgency felt by the people of the United States in obtaining answers to the problems of prevention and treatment of serious disease. The Committee believes the urgency is such that it can be satisfied only by the maximum utilization of the medical research potential of the country, as well as the contributions of competent investigators abroad.

Trained manpower and facilities are just beginning to become available in sufficient quantity and quality to mount a full-scale attack on these problems. Joined together in more efficient types of research organizations and provided with all the resources of new tools and techniques, investigators will be able to carry out the most highly refined and productive research yet imagined.

The budgetary requirements for the future depend very largely on the present status of medical knowledge, which will be the base for new advances, and on the decisions made today for the training of manpower and the construction of facilities.

The Committee does not agree with those who hold that further expansion of our medical research effort is impossible because of a shortage of manpower and facilities. In view of the opportunities which now open before us and the greatly magnified potential productivity noted above, it believes that a remarkable increase in medical research activity would be possible with the manpower now available.

If the efforts at recruitment of young men and women into the medical sciences are intensified, as recommended by this Committee, if the medical educational capacity of our country is expanded so that we can increase the

number of physicians and dentists trained, and if the number of Ph. D. candidates in the basic sciences continues to rise, the manpower available in the future will permit such an increase in the breadth and depth of the stream of medical research that the chances of finding answers to some of our most pressing disease problems will be immeasurably improved.

The Committee therefore foresees the need for much larger appropriations in the future to support a greatly expanded research effort in the attack on the major problems of disease and disability confronting us today. These larger appropriations will come from both Federal and non-Federal sources, and in this partnership Federal funds must supplement those of the States, industry, and private philanthropy as may be necessary to accomplish the task. The expansion of Federal support should not be limited by, or paced by, the rate of growth of non-Federal sources of funds.

The cost of this program will seem substantial compared with expenditures in the past, but will be insignificant in consideration of the return on this investment. The Committee is confident that the projected growth of our economy will allow us to meet the needs of medical research without appreciable strain and that support of the program proposed in this report will be met by "brave men and brave dollars."

Given the determination and the funds, the manpower can be trained and the facilities can be constructed.

The Congress should, therefore, be prepared to support a dynamic program of medical research which will expand as rapidly as the men and ideas become available.

PART A.—PAST AND PRESENT PROGRAM OF FEDERAL SUPPORT OF MEDICAL RESEARCH

Chapter I

ADEQUACY OF FEDERAL SUPPORT OF MEDICAL RESEARCH

A consideration of the adequacy of support for medical research can only be undertaken in relation to need. When one reviews the remarkable improvement in the health and longevity of the American people which has been achieved through medical research since 1900, one questions how much faster this progress could have been achieved if more generous support had been available at a time when knowledge of disease which we take for granted today was waiting to be discovered.

Examples of the contributions of medical research during this period will be mentioned in the next section of the report, but at this point it is pertinent to note that the average life expectancy at birth was increased from 49.2 years in 1900 to 69.6 years in 1956, a gain of 20.4 years (table 1). This has resulted primarily from the conquest of most of the communicable diseases in all age groups and a great decrease in other causes of infant mortality.

The spectacular advances of the first half of this century are now reflected in a great shift in emphasis in medical research from the infectious diseases to the chronic, metabolic, and degenerative diseases and to cancer.

We are now confronted for the most part by the medical problems of the older age group, which has been so greatly increased in numbers. These problems are in many ways more complicated than those of the infectious diseases. It is noteworthy that between 1900 and 1956 the life expectancy for those reaching age 60 increased only 2.7 years, and for those reaching age 70, only 2.0 years. Moreover, there has been essentially no change in life expectancy for any age group in the last 3 years for which figures are available (table 1). This suggests that, although we have essentially eliminated many causes of death and disability in the younger age group, we have made little progress against the main causes of death after age 60, cardiovascular disease and cancer. Despite the great advances in our knowledge of the nature and treatment of these disorders, we have not learned enough to keep pace with environmental factors, largely unknown, which seem to be responsible for an increase in their incidence.

TABLE 1.—*The average remaining lifetime in years at specified ages, 1900–1902, 1919–21, 1939–41, 1956, 1957, and 1958* [1]

Age	1900–1902	1919–21	1939–41	1956	1957	1958 (estimate)
0	49. 24	56. 40	63. 62	69. 6	69. 3	69. 5
5	54. 98	57. 99	62. 49	66. 7	66. 5	66. 7
10	51. 14	53. 79	57. 82	61. 9	61. 6	61. 8
20	42. 79	45. 30	48. 54	52. 3	52. 0	52. 2
30	35. 51	37. 68	39. 67	42. 9	42. 7	42. 8
40	28. 34	30. 08	31. 03	33. 7	33. 4	33. 5
50	21. 26	22. 50	22. 98	25. 1	24. 8	24. 9
60	14. 76	15. 54	15. 91	17. 5	17. 3	17. 3
70	9. 30	9. 74	10. 00	11. 3	11. 2	11. 2

[1] For 1900–1902, data are for 10 States and the District of Columbia; for 1919–21, data are for 34 States and the District of Columbia; for 1939–41, 1956, 1957, and 1958, data are for the entire continental United States.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service. *Summary of Health and Vital Statistics*, PHS Pub. No. 600 (June 1958), p. 25.

It is a curious fact that, in spite of our great progress in the fight against disease, the needs and opportunities of medical research of which we are aware today are even greater than those which were recognized 20 years ago. This is not difficult to explain. We have greatly increased the number of trained scientists working in medical research who can appreciate the new problems revealed by the solution of old ones and by the recent additions to our store of medical knowledge. During the past 20 years, we have developed facilities in which research can be carried out more effectively and with greater refinement than ever before. New tools developed through the advances in knowledge in the basic sciences are providing new possibilities for research of almost limitless dimensions. Our knowledge of living organisms has been immensely extended, and we are now approaching a relatively clear understanding of the most fundamental biochemical and physical nature of the life processes in health and disease. Our horizons in the direction of the infinitely small have been enlarging quite as rapidly as our horizons in the direction of the infinitely big. Electronmicroscopy has revealed a strange new world of structure to be correlated with function, and the introduction of X-ray microscopy will discover still smaller wonders which we must learn to understand. The basic sciences are merging in a unified attack on many problems such as the mechanisms of enzyme and hormone actions, the physicochemistry of chromosomes and genes as a basis for heredity and the structure and function of ribonucleic acid and deoxyribonucleic acid which seem to control the life processes in body cells and micro-organisms.

Such major extensions of our basic knowledge, the development of new tools and techniques and the availability of trained scientists to use them, are enabling us to make new approaches to the problems of disease. Through continued research, and at a rate which in large measure will be determined

by the amount of support provided, we shall make progress toward the prevention, alleviation, and cure of many of the disease conditions of greatest concern to mankind.

Support of Medical Research

To determine whether the support of medical research has been and is now sufficient in relation to the research needs and opportunities existing at any particular time is primarily a matter of judgment. The total national expenditures for medical research have been increasing fairly steadily over the past 20 years, as shown in table 2, from $45 million in 1940 to $715 million in 1960 (estimated). During this period Federal support of medical research has increased from $3 million in 1940 to $380 million in 1960 and its percentage of the total has risen from 7 to 53 percent.

TABLE 2.—*Total, Federal, and non-Federal medical and health-related research expenditures, 1940–60*

[In millions]

	Total national medical research	Non-Federal medical research	Federal medical research	Federal as percent of total national medical research
1940	$45	$42	$3	7
1947	88	60	28	32
1950	148	88	60	41
1953	203	107	96	47
1954	225	118	107	48
1955	240	122	118	49
1956	285	150	135	47
1957	397	211	186	47
1958 (estimated)	491	264	227	46
1959 (estimated)	587	296	291	[1] 50
1960 (estimated)	715	335	380	[1] 53

[1] Data on Federal expenditures are available at beginning of fiscal year; data on non-Federal expenditures cannot be obtained until after the end of the fiscal year. Therefore, estimates for 1959 and 1960 may overstate the Federal share.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Program Planning, Resources Analysis Section (January 1960).

The Federal support for medical research has been provided primarily through the Department of Health, Education, and Welfare. Estimated medical research expenditures by Federal agency for fiscal years 1957–60 are shown in table 3. It will be noted that in fiscal year 1960, the Department of Health, Education, and Welfare is expected to spend $314.2 million or 82 percent of the $380 million total, the Department of Defense $29.3 million or 8 percent, the Atomic Energy Commission $18.3 million or 5 percent, and the Veterans' Administration $15.3 million or 4 percent.

TABLE 3.—*Source of medical and health-related research expenditures by Federal agency, 1957–60*

[In millions of dollars]

Agency	1957		1958 estimate		1959 estimate		1960 estimate	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Total	$186	100	$227.2	100	$290.5	100	$379.8	100
Health, Education, and Welfare	138	74	179.7	79	236.3	82	314.2	82
Defense	23	12	23.6	11	24.2	8	29.3	8
Atomic Energy Commission	14	8	13.5	6	16.1	6	18.3	5
Veterans' Administration	11	6	10.0	4	12.9	4	15.3	4
Other [1]			.4	(2)	1.0	(2)	2.7	1

[1] Includes funds from the Federal Aviation Agency, Department of State (ICA), Office of Civil and Defense Mobilization, Tennessee Valley Authority, and Department of Interior in 1958, 1959, and 1960; and from the National Aeronautics and Space Administration in 1960.

[2] Less than 0.5 percent.

Source: U.S. Department of Health, Education, and Welfare, National Institutes of Health, Office of Program Planning, Resources Analysis Section (January 1960).

Have these funds been sufficient to support the men with ideas capable of doing good research and of undertaking the special investigations essential to the specific health missions of those Federal agencies sponsoring medical research?

The Committee finds that the support provided by the Congress over the past 15 years has been substantial and has resulted in a great increase in the size and strength of our medical effort. Many men have received excellent research training, and some fine laboratories have been built and equipped. Medical education, the training of manpower for research, and the quality of medical practice have all been strikingly improved. However, the funds provided have only partially compensated for a large preexisting deficit in the dollar support for medical research. Much more could have been accomplished if greater support had been forthcoming earlier, and the research potential now available is still not receiving sufficient support to make the contribution of which it is capable.

More detailed discussion of areas in which the Committee finds Federal support inadequate will be found in later sections of this report. At this point the Committee would like to emphasize that if we are to utilize the medical research potential of this country to the maximum in a major attack on the dread diseases, if we are really to make the most of the new research opportunities opening up before us, and if we are to gain the greatest advantage from the new tools and techniques now becoming available, we have very definite and urgent needs which must be met as quickly and in as sustained a manner as possible.

For the great advances in medical research that are possible for the future, one of the greatest needs will be the training of many more physicians, dentists, Ph.D.'s, technicians, and paramedical personnel. A much greater support of training programs and fellowships is therefore essential. This will unquestionably require the expansion of our educational capacity in these fields as well as in many others and the construction of medical educational facilities.

The second great need is for improvement and expansion of the facilities within which medical research is carried out. Although Federal funds have helped greatly, especially through the Health Research Facilities Construction Act and the Hill-Burton program, to renovate and build excellent laboratories and hospitals, many more are needed. New developments in equipment and instrumentation promise a tremendous increase in the dimensions of research but will require new types of facilities and the establishment of special centers in which such work can be undertaken. These centers will be costly, but their availability will extend immeasurably the effectiveness of the individual investigator.

Our support of health research facilities construction is today much too small in proportion to the need and to the funds being expended for research. This area represents one in which the Committee finds the funds appropriated to be quite insufficient.

A third area in which the funds appropriated have proved inadequate is in the support of research possibilities. Some of the greatest deficits and wasted opportunities for medical research exist in the armed services and the Veterans' Administration and are caused almost entirely by budgetary limitations. For the Public Health Service, too, larger appropriations are needed. Although in the case of the National Institutes of Health, the funds appropriated for fiscal year 1960 approximated the needs for some of the institutes, they were inadequate for others, and a total of $23 million in approved but unpaid applications for research grants, training grants, and fellowships is anticipated by the end of fiscal year 1960. The continuing growth of medical research in this country will make the present level of support for all Institutes grossly insufficient for the coming year.

In the program for the future, State, industrial, and private sources should be encouraged to contribute as much as possible. However, this Committee believes that these sources cannot be expected to provide even half of the support which will be required, and that the Federal Government should supplement their efforts to whatever extent may be necessary.

Conclusion:

The funds appropriated by the Congress for the support of medical research, although substantial, are still not sufficient to assure the full utilization of the Nation's potential for an attack on the dread diseases, and the present level of support is far from adequate to permit the great advances essential for the future.

Recommendation:

ROLE OF FEDERAL GOVERNMENT IN SUPPORT OF MEDICAL RESEARCH

The Federal Government should supplement private, industrial, and State funds, as may be necessary, to support medical research on the scale required to carry out a determined attack on major health problems. The magnitude of Federal support should be neither limited by, nor paced by, the rate of increase of non-Federal sources of support.

Chapter II

EFFECTIVENESS OF UTILIZATION OF FEDERAL FUNDS APPROPRIATED FOR MEDICAL RESEARCH

The effectiveness of a health program can be measured by many yardsticks. To a parent agonized by the illness of a child, the effectiveness of a medical procedure has a personal and immediate significance. To the humanitarian, the saving of life and the alleviation of human suffering are objectives so noble as to be beyond price. Such humane considerations have largely prevailed in mobilizing funds for medical research in the past. The great advances in medicine which have occurred as a result of our health programs in the modern era can also be evaluated in numerical terms and by financial calculations, and we can assess the effectiveness of medical research in relation to the effort and cost of the program.

The history of medical research provides many examples to illustrate the economic importance of controlling disease. The great plague of London, according to Dafoe, took a toll of 200,000 lives, caused the nearly complete evacuation of the city, and brought all overseas trade to a complete standstill for more than a year. Mosquito control procedures leading to the control of yellow fever made possible the building of the Panama Canal. In still more modern times, the control of infectious diseases and the reduction of infant mortality have provided the manpower by which our war efforts and our economic expansion have been supplied.

More direct statistics can be provided. The cancer cure rate has changed during the last few years from 1 in 4 to 1 in 3. Of the 450,000 new patients stricken each year, 150,000 are now saved annually through application of our recently acquired research knowledge. The annual loss to our economy from cancer has been estimated in 1958 at $12 billion. Against these figures, the $56 million invested in research by the Cancer Institute during that year seems small indeed and appears to have earned remarkable dividends.

Many other examples could be cited from which the economic advantages accruing from medical research could be estimated. Tuberculosis, once the great white plague, is today a treatable disease, the death rate from which has dropped 80 percent in the last 15 years. Retrolental fibroplasia, a disease causing blindness at birth, is now almost abolished. The number of cases of venereal diseases has been greatly reduced, although recently there has been an upswing correlated with the reduction of funds for control.

From all of the statistics available, it has been estimated that 1,800,000 lives have been saved in the last 15 years as a result of our health research program. The annual earning capacity of these people was $3.6 billion in 1958, and their tax contribution to our Federal Government $623 million. Judged from any or all of these figures or analyses, no conclusion is possible except that the agencies supporting medical research have operated with remarkable effectiveness.

The National Institutes of Health, to which Congress has entrusted the chief responsibility for the disbursement of funds for medical research, has developed an extremely successful system of review and approval of applications for research grants, training grants, and fellowships. This plan, relying on close supervision by the scientists themselves, has operated in such a manner as to win the admiration and confidence of the entire scientific community.

In any program of this magnitude some waste is inevitable. Since each research project is in a sense a gamble on the brains and skill of the investigator, not all research projects have been productive or brought to successful conclusions. The research advisers are human and not infallible in their judgments, but the Committee believes that the funds have been expended as wisely as human judgment would permit.

The administration of the National Institutes of Health program has been in the hands of unusually competent and dedicated individuals who have taken great care to avoid any interference with the institutions in which the research is carried out or with the individual investigators.

The Committee would like to commend the National Institutes of Health for the flexibility and adaptability it has shown in meeting the problems encountered in the development of its present program, and in discarding methods of operation which have proved inefficient or impractical. It is confident that the National Institutes of Health will hold its administrative mechanisms under continuous study to assure that they remain responsive to new requirements.

In the dynamic program of medical research which the Committee foresees for the future, it believes that the excellent system of support of research grants to individual investigators through their schools, after central review by committees of experts in the field, will remain the most important part of the program.

Research funds, however, must be provided to an increasing degree under terms and conditions which will permit scientists still broader latitude to pursue their own ideas and assure them greater stability of support.

New opportunities are developing for a large-scale multidisciplinary attack on disease problems, and these will have the result of uniting the efforts of many investigators into large comprehensive collaborative research programs or into clinical research centers. These will require a different type of program evaluation from the individual research grants, but should eventually simplify the problems of central review.

Efficiency in the allocation of increased research funds and their effective use can be achieved through new administrative patterns, some now apparent and others to be evolved.

One of the major sources of difficulty in the wise expenditure of funds for new programs by the National Institutes of Health has unintentionally been created by the requirement that the funds be allocated within the fiscal year of their appropriation. Because of the problems this restriction imposes on sound planning and the recruitment of appropriate administrative personnel, liberalization of the time limit should be considered and would permit more efficient utilization of the funds.

Conclusion:

Considering the program as a whole, the funds appropriated by the Congress for the support of research on major disease problems have been efficiently spent in the best interests of the research for which they were designated.

Recommendations:

(1) NEW ADMINISTRATIVE PATTERNS FOR SUPPORT OF RESEARCH

For the effective allocation of the larger funds which will be required in the future, new administrative patterns for the support of research must be developed. These will include institutional grants, program grants, and large grants to clinical research and special resource centers. **(See p. 68.)**

(2) METHOD OF APPROPRIATION FOR NEW PROGRAMS

In order to assure the highest efficiency of utilization of funds for new programs and those requiring a long leadtime for effective planning, Congress should give serious consideration to granting funds on a 2-year basis (or more) when making appropriations for such purposes.

Chapter III

IMPACT OF THE EXPANDING FEDERAL PROGRAM IN SUPPORT OF MEDICAL RESEARCH

A. EFFECT ON MEDICAL SCHOOLS

The Federal program in support of medical research has given the medical schools of the country the opportunity to build up their research and teaching potential to a strength which could scarcely be imagined 15 years ago. Facilities have been improved and the number and quality of teachers in academic medicine have greatly increased. However, the full development of the present medical education capacity of the country and its expansion to meet the demands of our rapidly expanding population for additional trained manpower—teachers, investigators, and practitioners—in the future cannot be achieved until Federal help of other kinds also is forthcoming. As recommended in the Bane Report, these include: (1) health educational facilities construction, (2) payment of the additional costs of research, (3) institutional research grants, (4) an increase in training programs with greater emphasis on preparation for academic careers, and (5) the creation of additional stable academic career opportunities in medicine.

The Committee is deeply concerned that the problem of aid to medical schools should receive prompt attention. It is fully cognizant of the urgent educational needs at all levels in our country. It believes, however, that failure to produce doctors in proportion to our rapidly expanding population would court disaster in both the military and civilian sectors of our economy and would pose a threat to the national health and welfare which no citizen will tolerate.

The Committee recognizes that improved utilization of space and teaching time may permit some increase in the annual number of graduates without significant sacrifice in quality of training. It is convinced, however, that such measures will never answer the whole problem in more than a makeshift fashion and that a major program of health educational facilities construction is absolutely inescapable.

1. *Construction of Health Educational Facilities*

The long leadtime required to develop new medical schools and the greater cost of expansion of existing medical educational facilities as compared with expansion of facilities for other areas of education, require prompt and energetic action and careful planning.

The Committee considers the future growth of the country's medical educational capacity to be of such great importance that it urges immediate implementation through the Department of Health, Education, and Welfare, of the recommendations of the Bane Committee. In this effort the maximum encouragement should be given to the participation of local and State sources in the planning and financing of medical educational facilities.

The present group agrees with the Bane Committee that new health educational facilities should be built in close relationship to colleges or universities, either public or private, but preferably those with strong basic science departments. Furthermore, serious consideration should be given to those areas in which there is a great need for more physicians but a lack of opportunity for medical education and to those areas with the financial capacity to support the continuing operation of a medical school.

The Bane Committee estimated that, in order to maintain the present physician/population ratio of 141/100,000 (including osteopaths), we must increase our annual number of graduates from the 1959 level of approximately 7,400 physicians (6,900 M.D. and 470 D.O.) to a level of 11,000 by 1975 (table 4). Such an increase of 3,600 graduates per year can be achieved by (1) an expansion of existing medical schools, (2) the construction of new 2-year schools whose graduates can move into vacancies in the third-year classes of existing schools, and (3) the construction of new 4-year schools.

TABLE 4.—*Estimated number of physicians (M.D. and D.O.) in the United States, graduates at present production rates and the number required to maintain 1959 physician/population ratio: 1959–75*

Year	Graduates and physicians at presently planned rate			Graduates and physicians required to maintain 1959 physician/population ratio of approximately 141/100,000	
	Graduates	Total physicians	Number of physicians per 100,000 population	Graduates	Total physicians
1959	7,400	249,100	140.7	7,400	249,100
1960	7,500	253,400	141.4	7,500	253,400
1965	7,900	275,000	140.4	8,100	275,100
1970	7,900	294,900	137.9	9,600	299,000
1975	7,900	[1] 312,800	133.0	11,000	330,000

[1] Exclusive of physicians in military and other Federal services and assuming that the number of foreign graduates who are licensed to enter practice in this country will level out at 750 a year.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, *Physicians for a Growing America: A Report of the Surgeon General's Consultant Group on Medical Education* (October 1959).

It is encouraging that a careful canvass of the prospects of the existing medical schools by the Association of American Medical Colleges, reported in a recent article by Powers, Darley, and Oppermann,[1] reveals that if these schools

[1] Lee Powers, Ward Darley, and K. C. Oppermann, "National Goals for the Construction of Medical School Facilities," *Journal of Medical Education*, vol. 35, No. 2 (February 1960), pp. 108–119.

can obtain the financial help they need over the next 5 years to carry out required construction as well as to renovate and modernize their facilities, they will be able to increase their enrollment by 1,060 students. The cost of this program is estimated at $324.5 million, of which $288.6 million would represent new construction, mainly by the older schools.

The Bane Committee and the Association of American Medical Colleges study also found that last year there were 760 vacancies in third-year classes in medical schools of the United States owing to dropouts in the first and second years. If enough 2-year schools were built to yield 760 graduates per year who would be eligible for transfer to the 4-year schools and if the graduating classes from these schools averaged 50 students, a minimum of 16 such schools would be needed to fill the present number of vacancies in third-year classes. The average cost of building a 2-year school is estimated at $7–8 million. If 16 universities which do not now have medical schools could be persuaded to establish 2-year schools, this could be done for approximately $128 million. The Association of American Medical Colleges and the Council on Medical Education and Hospitals of the American Medical Association are encouraging universities to undertake such programs.

This still leaves a deficit of 1,800 medical school graduates who will be needed by 1975 to maintain the present physician/population ratio. If 18 new 4-year medical schools with graduating classes of 100 each were built at an average cost of $30 million per school, the total requirement for these new schools would be $540 million.

The entire cost, spread over the next 10-year period, for the expansion of existing schools ($325 million), the construction of new 2-year schools ($128 million), and of new 4-year schools ($540 million) would be $993 million.

The point of this rough calculation is to highlight an interesting computation also made by the Association of American Medical Colleges in the same study to the effect that in the years 1948–58 this country spent $1,633.6 million for construction in the interests of medical schools and their affiliated institutions (table 5). Of this total, private and State sources of funds contributed $1,415.3 million, or 87 percent, and the Federal Government only $218.3 million, or 13 percent. The 10 new 4-year medical schools built during that period cost $234 million (or approximately $23.4 million each) of which $22.8 million, or less than 10 percent was contributed by the Federal Government. The rest of the $1.6 billion was devoted to expansion and modernization of existing schools, including four 2-year schools.

TABLE 5.—*Total expenditures for construction of U.S. medical schools (Puerto Rico included) and their affiliated institutions since 1948*

[In millions of dollars]

Type of facility	Expenditures not involving matching funds	Expenditures involving Federal matching funds	Total expenditure for construction	
Educational and research	222.7	318.4 [1] (80.6)	541.1	781.6 (114.7)
Medical school-owned hospitals	112.9	127.6 [1] (34.1)	240.5	
Affiliated hospitals	340.6	467.9 [1] (94.0)	808.5	
Institutions other than hospitals used for teaching and research [2]	10.7	32.8 [1] (9.6)	43.5	
Total	686.9	[3] 946.7 [1] (218.3)	1,633.6	

[1] (Federal funds involved.)

[2] Many of these institutions are not owned and operated by the medical school (i.e., research centers, health departments, etc.).

[3] Note for every $1 of Federal funds, private, State, and university sources have expended $3½.

Source: Association of American Medical Colleges. *The Journal of Medical Education*, vol. 35, No. 2 (February 1960).

The estimated construction need of approximately $1 billion for medical schools alone over the next 10–15 years to maintain our physician/population ratio at its present level therefore does not seem unreasonable and could be achieved at an average national expenditure of approximately $100 million per year.

It should be emphasized that this is probably a conservative estimate. Inflation and the greater cost of new types of equipment may raise the cost of building a medical school to considerably more than the figure of $30 million used above. Nevertheless, this approximation gives some indication of the dimensions of the task before us and the amounts involved in creating the necessary facilities.

The comparable figures are not readily available for dental schools and schools of public health, but it would seem that for these schools also, the construction needs for the decade ahead are not likely to exceed very greatly those for the decade just past.

The present rapid growth of our population confers an urgency on the new construction of health educational facilities that cannot wait for the uncertain pace of non-Federal initiative in this field. Moreover, the Committee has heard testimony that many schools are finding increasing difficulty in obtaining matching funds. Therefore, the Committee believes that, although a large portion of the funds required will be forthcoming from State, private, and industrial sources, the Federal share in the proposed new construction of schools

of medicine, dentistry, and public health will have to be considerably greater than in the past.

The Committee therefore urges that funds be authorized and appropriated in this session of Congress to initiate a long-term program in support of the Federal share of health educational facilities construction which will be required to assure an ample production of doctors for research, as well as for teaching and practice, in the future.

Recommendation:

CONSTRUCTION OF HEALTH EDUCATIONAL FACILITIES

(See pp. 98–99.) The Federal Government should supplement the efforts of the States and of private sources to meet the construction needs of our public and nonprofit medical, dental, and public health schools by appropriating funds on a matching basis for:

(*a*) Improvement and/or expansion of existing schools of medicine, dentistry, and public health;

(*b*) New 2-year schools of basic medical sciences;

(*c*) New 4-year schools; and

(*d*) The necessary teaching hospitals.

2. *Payment of Full Costs of Research*

A major deterrent to the further expansion of medical research in the United States today is the failure of granting agencies, and especially the National Institutes of Health, to pay the full costs of the research they support. The difference between the actual costs and the percentage paid by the granting agency has had to be met from the institution's own funds. Since most schools of medicine, dentistry, and public health are having difficulty financing the rapidly mounting costs of medical education, funds for research can be provided only at the expense of other programs, activities, and functions which are also essential to the general missions of these institutions. The burden of the cost of research on the schools has reached such serious proportions that some measure of relief has become the most important single need in the minds of medical educators and administrators.

The expenditures for separately budgeted research in medical schools and universities in this country have been rising rapidly since World War II. For medical schools only, the figures recently released by the National Science Foundation,[2] based on its survey covering 80 medical schools for the year 1957–58, have shown more than a twofold increase since its last survey, from $45.3 million in 1953–54 to a total of $105.5 million in 1957–58, and a sixfold increase since 1947–48 when the level was $17.1 million.

[2] National Science Foundation, *Reviews of Data on Research and Development*, No. 3 (April 1957) and No. 17 (January 1960).

Expenditures for separately budgeted research in medical schools

	Million
1940–41	$3.5
1947–48	17.1
1953–54	45.3
1957–58	105.5

The distribution between sources of support is given in table 6. It can be seen that the research supported by the Department of Health, Education, and Welfare (chiefly by the National Institutes of Health) represented 48.6 percent of the total in 1957–58. The policy followed by the National Institutes of Health in reimbursement for the costs of research, therefore, has a major effect on the medical schools.

TABLE 6.—*Expenditures of U.S. medical schools for separately budgeted research by source of support, 1953–54 and 1957–58*

[In millions of dollars]

Source	Amounts		Percentage distribution		Percentage increase
	1953–54	1957–58	1953–54	1957–58	
Department of Health, Education, and Welfare	$14.2	$51.3	31.3	48.6	261
Other Federal	8.6	13.6	18.8	12.9	58
Non-Federal	22.6	40.6	49.9	38.5	80
Total	45.3	105.5	100.0	100.0	133

NOTE.—Detail may not add to totals due to rounding.

Source: Association of American Medical Colleges. *Datagrams*, vol. 1, No. 12 (June 1960). National Science Foundation.

Total indirect costs of separately budgeted research carried out in medical schools were calculated according to the formula most generally employed by the Department of Defense and other Federal agencies during that period, commonly called the "Blue Book Formula."[3] These amounted to $22.5 million in 1957–58 (table 7). Of this sum $10 million was paid by the sponsoring agencies and $12.5 million by the medical schools.

[3] Sec. XV, "Contract Cost Principles," Armed Services Procurement Regulations.

TABLE 7.—*Support of medical school indirect costs*

[Data based on Bluebook formula]

[In millions of dollars]

Source of payments	Federal		Non-Federal		Total	
	1953–54	1957–58	1953–54	1957–58	1953–54	1957–58
Sponsoring agency	[1] $2.4	[1] $7.6	$0.9	$2.4	$3.3	$10.0
Medical schools	5.1	6.6	4.0	5.9	9.1	12.5
Total	7.5	14.2	4.9	8.3	12.4	22.5

[1] NIH allowance for indirect costs increased during this period from 10 to 15 percent.

Source: Association of American Medical Colleges. *Datagrams*, vol. 1, No. 12 (June 1960).
National Science Foundation.

If the above relationship were still to hold when the national expenditures for medical research reach the $1 billion mark, as now seems likely before 1965, this would mean that the medical schools would have to invest $32 million, or $19 million more than in 1957–58, toward defraying indirect costs.

Fortunately, changes have been authorized in the policies of some Federal agencies since 1957–58. All three branches of the armed services and the National Science Foundation have recently been permitted to recognize more realistically the high cost of research to the institutions in which it is carried out. They are now allowing payment of the costs of research on research grants up to 20 percent of total direct costs, or actual costs based on the most recent audit by a Federal agency, whichever is lower. Full costs are uniformly paid on contract research. After July 1, 1960, all Government agencies that sponsor research and development under grants and contracts in educational institutions *except the National Institutes of Health* are expected to adopt the principles for costing research set forth in the Bureau of the Budget Circular No. A–21.

The National Institutes of Health is thus the only major Federal agency supporting medical research today through grants which does not pay either 20 percent of the direct costs or the full costs of research as determined by a cost analysis formula. This seems unfair discrimination against the National Institutes of Health as a source of support.

In 1957–58, the average of indirect costs of federally sponsored research for 80 medical schools as calculated by the "Blue Book Formula" was 25.1 percent (table 8) with a variation from less than 18 to more than 45 percent. The average has presumably increased still more since 1957–58 and the 20 percent allowance by the armed services and the National Science Foundation would seem to be inadequate in most cases. If a cost formula is used, the preferred one is that now advocated by the Bureau of the Budget in Circular No. A–21.

TABLE 8.—*"Blue-Book rate" of indirect cost as percent of research operating expenditures, U.S. medical schools, fiscal year 1958*

[Dollar data in thousands of dollars]

	Size category (indirect cost as percent of research operating expenditures)	Number of medical schools	Federally sponsored research operating expenditures	
			Amount	Percent of total
Grand total		80	$64,866	100.0
Total		74	63,349	97.3
	Less than 18.0	8	2,002	3.1
	18.0 to 19.9	3	837	1.3
	20.0 to 24.9	30	28,428	43.8
	25.0 to 29.9	15	16,617	25.6
	30.0 to 34.9	8	8,759	13.5
	35.0 to 39.9	4	2,410	3.7
	40.0 to 44.9	4	1,800	2.8
	45.0 to 49.9	2	2,278	3.5
	50.0 or more			
Overall weighted average percent of indirect cost for all 80 medical schools	25.1			

NOTE.—Detail may not add to totals due to rounding.
Source: National Science Foundation, Office of Special Studies.

Thus the Committee is convinced that the 20 percent allowance for the National Science Foundation and the armed services is still not high enough to cover the costs of research in the majority of schools and research institutions. It believes that payment of the full costs of research is essential to the further development of the research effort of the Nation.

Recommendations:

PAYMENT OF FULL COSTS OF RESEARCH

The National Institutes of Health should be authorized to allow a realistic amount for the costs of research directly related to the program supported. This could be provided in either of the following ways, listed in order of preference:

(1) Full costs as determined by a cost analysis formula (such as that proposed in the Bureau of the Budget Circular No. A–21), or

(2) Twenty-five percent of total direct costs except for those institutions which have formally established lower rates on the basis of audit by a Federal agency. (The average figure for medical schools audited under the "Blue Book Formula," reported to the National Science Foundation in its 1957–58 survey, was 25.1 percent.)

3. *Institutional Grants*

The general effect of the Federal program in support of medical research on the medical schools and research institutions of the country has been extremely beneficial and has enabled them to develop facilities and strengthen their faculties in a truly remarkable manner.

There is concern, nevertheless, that the Federal program may produce some distortion in the teaching and research programs of medical schools and research institutions unless they are provided funds with which they can balance their research programs. The support of investigators by a Federal agency on an individual project basis, after review and approval by committees of experts, has been outstandingly successful and has been carried out with great wisdom and flexibility. This support, however, comes to the schools and research institutions through requests of individual investigators without regard for the overall plans of the institution and with conditions attached which may not fit into its program. This can lead to an uneven development which may not be in the best interests of the institution as a whole.

The institutions are experiencing increasing difficulty in meeting the rising costs and mounting pressures involved in the performance of their teaching, research, and service functions. Although they need to expand their faculties, they cannot establish and maintain enough rewarding full-time faculty positions with tenure to accommodate senior research scientists at the completion of their long periods of training. They often have difficulty in supporting initial pilot research in new areas or by new and untried investigators who are not yet ready to send in projects for review by national advisory groups. They cannot manage out of their general operating funds to acquire and maintain the elaborate new types of equipment and research resources which are needed for the medical research of today and tomorrow, or to maintain adequately libraries, animal resources, and general research services.

In the face of the many pressures to which they are now subjected, these institutions are finding it almost impossible to maintain a desirable balance in the research and teaching programs of their various departments and to pursue their own research goals with continuity of purpose.

The National Institutes of Health has recognized these problems and has the support of the Administration in proposed legislation which, if passed, would permit a certain percentage of the total National Institutes of Health appropriation for research grants to be administered as grants to "public and nonprofit universities, hospitals, laboratories, research institutes and other institutions for the general support of their research and research training programs."

Such grants, by returning to the institutions a greater responsibility for the administration of research money, and permitting its use to build up the general research facilities of the schools, to establish more research faculty positions with tenure, and to support research in consideration of the specific needs and interests of the institution, would greatly strengthen the role of the institutions in administering their research programs under conditions and in directions of their own choice. Decisions involving purely local matters, such as the selec-

tion of part-time research fellows and recipients of postsophomore grants, could be left to the institutions. The resulting decentralization would lessen the burden of central review and minimize Federal administration.

The National Institutes of Health has proposed that institutional grants be made on a formula basis with a basic amount to all schools and an increase above that sum dependent on the research capacity and current research load of each institution and the outside funds it is able to attract. This should be done in a way to assure help for the less well-financed schools.

The initial proposal is to limit to 15 percent the proportion of the research grant appropriation which can be awarded as institutional grants. This Committee believes it is unwise to impose a limitation. Although it feels that individual research grants should continue to represent the major part of the grant program, it anticipates that the institutional grants will prove exceedingly valuable and that a larger share of the total should probably be so allocated in the future. It would, therefore, recommend that no ceiling be imposed on the percentage devoted to institutional grants and that this decision be left to administrative determination on the basis of experience.

Recommendation:

INSTITUTIONAL GRANTS

The Public Health Service should be permitted by law to make institutional grants, upon recommendation of the appropriate council of the National Institutes of Health, to public or nonprofit universities, hospitals, laboratories, research institutes, and other institutions, for the general support of their medical research and research training programs.

The proposed limit on such grants to 15 percent of the total research grant appropriation should be removed, and the relation of institutional grants to the total research grant program should be administratively determined. The current highly effective project grants should continue as a major method for the support of research.

4. *Increase in Training Programs*

Central to any consideration of the expansion of our medical education capacity to meet the demands of our increasing population and the production of more teachers, investigators, and practitioners, is the need for additional highly trained manpower. In order to staff the basic science departments of the colleges, universities and medical, dental, and public health schools of the future, we shall urgently require increased numbers of basic scientists, physicians, dentists, and public health officers. These can be provided only by increasing the magnitude and depth of our fellowship and training programs at all levels, with greater emphasis on preparation for academic careers. (See pp. 69–70, 96.)

5. *Creation of Additional Opportunities for Stable Academic Careers*

In spite of our great need for more doctors in teaching and research, and the large number of promising young investigators coming out of the training programs, the fact is that most of the schools cannot find the funds to increase their faculties. Faced with urgent and continuing demands for teaching personnel, they find it especially difficult to provide funds for research professorships which have proved of remarkable value wherever they have been established.

The Committee believes that a greater number of stable academic career opportunities in research must be provided for the future: (1) to permit a greater number of outstanding investigators to make their maximum contribution to the research effort; (2) to help create a stimulating spirit of inquiry in our medical schools and to give inspiration and challenge to medical students, house officers, and younger investigators; and (3) to persuade promising young investigators to remain in academic medicine. (See p. 96.)

B. EFFECT ON MEDICAL PRACTICE

Much heat has been generated in argument as to whether the Federal program in support of medical research has had an adverse effect on medical practice and patient care. The Committee understands the basis for this concern but believes it to be unjustified.

It is true that the number of practicing physicians per 100,000 population has decreased in the United States from 108/100,000 in 1940 to 91/100,000 in 1958 (table 9). There are many reasons for this, and they do not necessarily add up to a detrimental effect on medical care.

TABLE 9.—*Ratio of doctors of medicine and of doctors of medicine in private practice to the population of the United States, 1931–59*

Year	Population [1] (in thousands)	Total number of M.D.'s	Number of M.D.'s in private practice	Ratio per 100,000 Population	
				All M.D.'s	M.D.'s in private practice
1931	124, 149	156, 406	134, 274	126. 0	108. 2
1940	132, 122	175, 163	142, 939	132. 6	108. 2
1949	149, 188	201, 277	150, 417	134. 9	100. 8
1957	171, 198	226, 625	155, 827	132. 4	91. 0
1958	174, 064	230, 600	[2] 158, 261	132. 5	90. 9
1959	177, 103	235, 000	----------	132. 7	----------

[1] U.S. Department of Commerce, Bureau of Census. *Current Population Reports: Population Estimates*, Series P-25, Nos. 215 and 187. Figures include Armed Forces overseas but exclude Alaska and Hawaii.

[2] American Medical Association. *American Medical Directory, 1958*, p. 13, table 3.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, Division of Public Health Methods. *Health Manpower Source Book: Section 9, Physicians, Dentists, and Professional Nurses*, PHS Pub. No. 263, sec. 9. Washington: U.S. Government Printing Office, 1959.

The total number of physicians per 100,000 population has remained constant and the decrease in the proportion going into practice is counterbalanced by an increase in the percentage engaged in hospital service and in part- or full-time teaching and research (table 10). Thus the number in hospital service has increased from 14,000 in 1940 to 36,000 in 1957, the number in full-time teaching, research, public health, industrial medicine, and military service increased from 8,100 in 1940 to almost 24,000 in 1957, and the total in both groups in 1959 has presumably continued to rise.

TABLE 10.—*Number of physicians (M.D.) in the United States and ratio to population, by type of practice: 1931–59*

Type of practice	1931	1940	1949	1957	1959
	Number of physicians				
Total	156, 406	175, 163	201, 277	226, 625	236, 089
Private practice	134, 274	142, 939	150, 417	155, 827	160, 592
General practice and part-time specialty	112, 116	109, 272	95, 526	81, 443	81, 957
Full-time specialty	22, 158	33, 667	54, 891	74, 384	78, 635
Not in private practice	16, 151	22, 351	41, 160	60, 137	65, 180
Hospital service	9, 700	14, 209	24, 887	36, 371	39, 730
Teaching, research, public health [1]	2, 900	3, 349	3, 737	7, 168	7, 931
Federal Government	3, 551	4, 793	12, 536	16, 598	17, 519
Retired	5, 981	9, 873	9, 700	10, 661	10, 317
	Physicians per 100,000 population				
Total	126. 0	132. 6	134. 9	132. 4	133. 3
Private practice	108. 2	108. 2	100. 8	91. 1	90. 7
General practice and part-time specialty	90. 3	82. 7	64. 0	47. 6	46. 3
Full-time specialty	17. 9	25. 5	36. 8	43. 5	44. 4
Not in private practice	13. 0	16. 9	27. 6	35. 1	36. 8
Hospital service	7. 8	10. 8	16. 7	21. 2	22. 4
Teaching, research, public health	2. 3	2. 5	2. 5	4. 2	4. 5
Federal Government	2. 9	3. 6	8. 4	9. 7	9. 9
Retired	4. 8	7. 5	6. 5	6. 2	5. 8

[1] Includes also industrial and insurance medicine and other nonprivate practice.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, Division of Public Health Methods.

This change in distribution may be in part attributed to the great increase in medical knowledge to be assimilated, to the increasing trend toward specialization and the longer period of training required by the specialty boards, and to the increased interest of young physicians in research and their realization that a continued relationship with teaching and research will permit them to practice better medicine. The larger number of opportunities for careers in teaching and research which exist now as compared with 20 years ago, and some improvement in the incomes available in academic medicine, have also been important factors.

It should be noted that some of the training programs of the National Institutes of Health have increased the numbers of specialists in certain fields which were poorly supplied before.

The relative decrease in the number of practicing physicians does not mean that patients are today receiving less effective care. Actually, the Committee is convinced that the reverse is true. New discoveries and new patterns of medical care now permit one doctor to attend many more patients in a given period of time than ever before. The easy and quick prevention of many infectious diseases, the shorter course of treatment now required for many conditions, and the increasing tendency toward group and hospital practice still further extend the range of effectiveness of the individual physician and in large part offset the increased demands for medical care created by the greater number of children and of old people in our population.

The remarkable advances of medical research translated into medical practice have raised the standards of medical care which *can* be achieved to the highest level in the world today. But this high standard cannot be achieved in relation to the full range of medical needs until we can supply more physicians, improved facilities, and supporting personnel.

Beyond the provision of facilities, equipment and supporting personnel, the only means by which the quality of medical care and the effectiveness of the practicing physician can be still further increased is through medical research and the application of the findings of research. The doctor is dependent on the ammunition that medical research puts into his hands and which has enabled him to treat or prevent diseases, such as tuberculosis, syphilis, pneumonia, poliomyelitis, hypertension, rheumatoid arthritis, and many forms of congenital heart disease against which he was almost helpless at the beginning of the century.

It seems fair to state that the doctor of today is much more effective than his colleague of a generation ago and can therefore handle many more patients in a given period of time and treat them more efficiently. In fact, therefore, medical research has *added* to the medical manpower available for health services and has done so, not by multiplying the number of practitioners of medicine, but by increasing the ammunition of the individual doctor.

Conclusion:

The contribution of medical research to medical practice in terms of new knowledge, techniques, and methods of patient care has been a prime factor in the increase in effectiveness of the individual physician and in raising the standard of medical care to the highest level ever achieved. This gain has outweighed the developing quantitative shortage of medical manpower.

C. EFFECT ON NON-FEDERAL SOURCES OF SUPPORT

The support of medical research from State, industrial, and private sources has increased greatly since World War II during the period of the rapid growth of the Federal program. Thus the total amount of non-Federal support has increased from $60 million in 1947 to an estimated level of $335 million in 1960 (table 2, p. 3). In this period the Federal support has risen from $28 million in 1947 to $380 million in 1960 (from 32 percent to 53 percent of the total). The fact that the increase in Federal support has been more rapid than in non-Federal support is considered by this Committee as a measure of the urgency which the public through their representatives in the Congress places on this effort.

The non-Federal sources of support include State governments, industry, philanthropy, and endowment. Each of these sources has increased since 1947 (table 11) during the period of rapid increase in the Federal program except endowment which has been about constant during the past 3 years.

TABLE 11.—*Source of funds for medical and health-related research*

[In millions of dollars]

Source of funds	Prewar (1940)		Postwar (1947)		1957		1960 estimate	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Total	$45	100	$88	100	$397	100	$715	100
Federal Government	3	7	28	32	186	47	380	53
State Government [1]	------	------	------	------	10	2	20	3
Industry	25	55	35	40	126	32	215	30
Philanthropy	12	27	15	17	56	14	81	11
Endowment	5	11	10	11	19	5	19	3
Total non-Federal	42	93	60	68	211	53	335	47

[1] Unavailable for years prior to 1957.

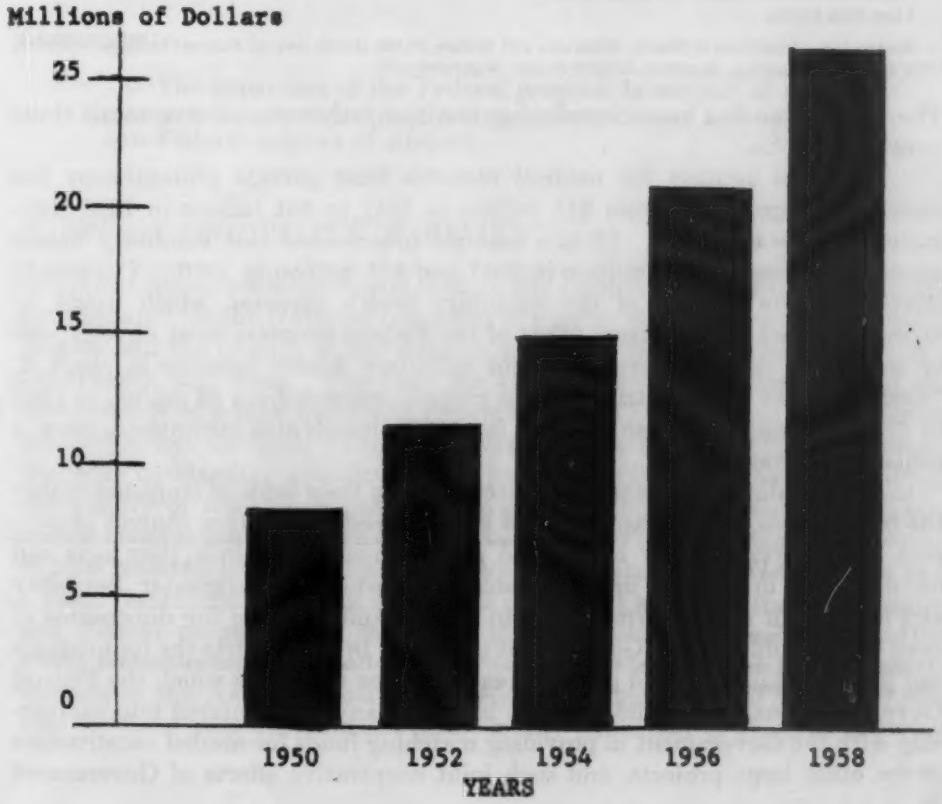
Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Program Planning, Resources Analysis Section (January 1960).

The contribution of State Governments has been studied accurately only within the past 3 years, during which it has doubled to an estimated $20 million in 1960.

Industry has increased its support of medical research from $35 million in 1947 to $215 million in 1960, over fivefold, and now contributes 30 percent of the total support. Research is vital to the progress of most industrial efforts, and the pharmaceutical industry understands this clearly. Industrial research is largely "applied" and in the pharmaceutical industry is oriented toward drug research, but industry also supports a great deal of basic research in universities and medical schools and in its own organizations. Its contribution is substantial.

The subject of greatest speculation in regard to the effect of the expanding Federal program has been that of private philanthropy. Has the knowledge that Federal funds are now more readily available for the support of medical research than in the past tended to dry up the collections of the voluntary health agencies, to decrease the support by foundations in the health field, or to discourage the formation of new foundations with medical orientation?

Chart A. TRENDS IN VOLUNTARY HEALTH AGENCY SUPPORT OF MEDICAL RESEARCH, 1950-1958



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[In millions of dollars]

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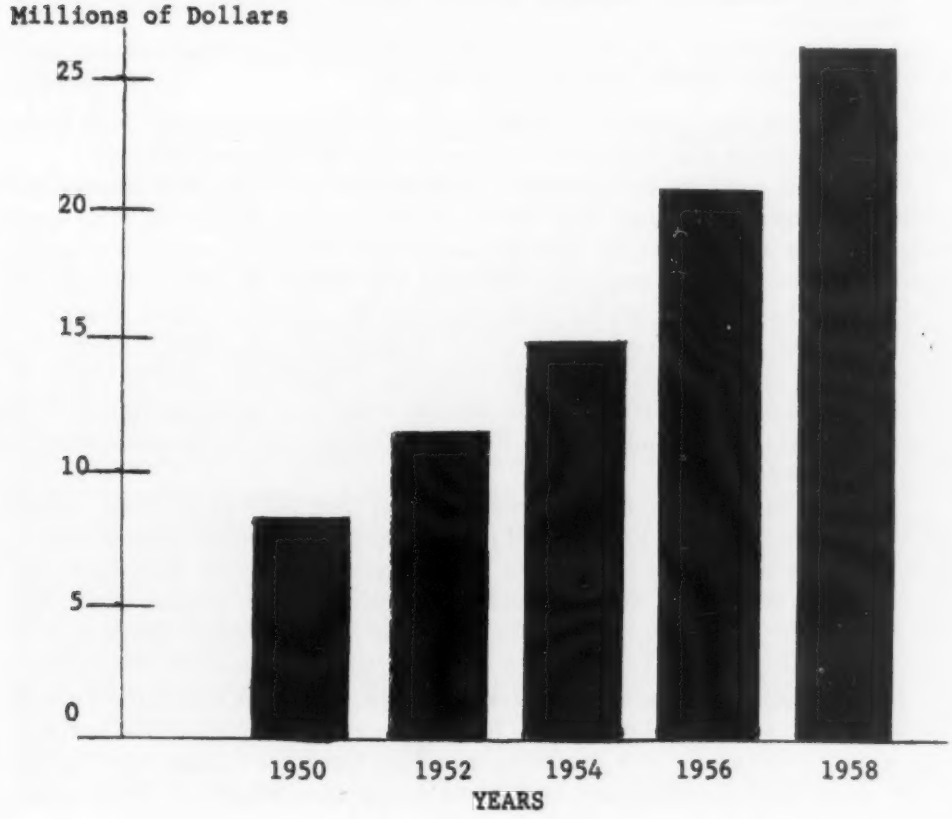
The subject of greatest speculation in regard to the effect of the expanding Federal program has been that of private philanthropy. Has the knowledge that Federal funds are now more readily available for the support of medical research than in the past tended to dry up the collections of the voluntary health agencies, to decrease the support by foundations in the health field, or to discourage the formation of new foundations with medical orientation?

Chart A. TRENDS IN VOLUNTARY HEALTH AGENCY SUPPORT OF MEDICAL RESEARCH, 1950-1958



[Millions of dollars]

Health agency	1950 [1]	1952 [1]	1954 [1]	1956 [1]	1958 [2]	Ratio,[3] 1950/58 [2]
Total	$8.0	$11.3	$14.7	$20.4	$25.7	3.2
National Foundation (of Infantile Paralysis)	2.3	3.3	2.6	3.1	3.3	1.4
American Cancer Society	3.8	4.6	6.0	7.7	8.6	2.2
National Tuberculosis Association	.2	.3	.4	.8	.8	3.7
American Heart Association	1.2	2.3	3.8	6.2	8.4	6.9
National Society for Crippled Children and Adults	.1	(4)	.1	.1	.3	2.5
United Cerebral Palsy Association	(4)	.1	.5	.5	.5	462.0
Muscular Dystrophy Association of America	(4)	.3	.8	1.4	2.5	108.4
National Association for Mental Health, Inc	(4)	.1	.1	.1	.7	16.7
Arthritis and Rheumatism Foundation	.2	.3	.4	.5	.6	2.7

[1] The National Health Education Committee, Inc. *Facts on the Major Killing and Crippling Diseases in the United States Today* (1959 ed.).

[2] American Association of Fund-Raising Council (Apr. 20, 1959).

[3] Ratio calculated on basis of unrounded figures.

[4] Less than $50,000.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Program Planning, Resources Analysis Section (September 1959).

The Committee has heard convincing testimony that the answer to all these questions is "No."

The total support for medical research from private philanthropy has increased progressively from $15 million in 1947 to $81 million in 1960 (estimated). (See table 11.) Of this amount foundations and voluntary health agencies represented $15 million in 1947 and $55 million in 1960. The steady increase in the support of the voluntary health agencies, which would be expected to feel any deterrent effect of the Federal program most directly, can be seen from the data on nine major voluntary health agencies in chart A. These increased their contributions to medical research from $8 million in 1950 to $25.7 million in 1958 and figures for 1959, though still incomplete, show a continued upward trend.

The foundations have in some cases changed their fields of emphasis within the life sciences, shifting to points of greater need when other sources of support became available for established project areas. However, they have had no difficulty in finding urgent problems in which their greater flexibility and freedom of action permit them to explore and evaluate the dimensions of need more readily than a Government agency. In such efforts the foundations can play a unique role and give leadership in new directions which the Federal Government may later follow. They have in many cases entered into partnership with the Government in providing matching funds for needed construction or for other large projects, and such joint cooperative efforts of Government

with private philanthropy and industry can be expected to increase with great benefit in the future.

One source of funds which has been only partially evaluated to date is the numerous small foundations that have been established in the health field, especially in the past 10 years, many of them by the families of patients who have received benefit from the efforts of medical research. While their total contribution per year may be small, the fact that they are being established is further evidence that the Federal program has not prevented an increase in private giving.

The Committee is convinced that, far from deterring State and industrial participation, public contributions to voluntary agencies, grants from foundations, and the establishment of new foundations in the health field, the Federal effort including the matching funds programs of the Hill-Burton hospitals and the health research facilities construction, has served as a stimulus to non-Federal sources of support to contribute still more substantially. The great diffusion of health knowledge to the public from both Federal and non-Federal programs has been mutually beneficial, and the greater consciousness on the part of the public of the needs of medical research has resulted in both an increase in support of medical research through foundations and voluntary health agencies and an increased determination on the part of the taxpayers to support medical research through their tax dollars.

Conclusion:

The expansion of the Federal program in support of medical research has served as a stimulus, rather than as a deterrent, to non-Federal sources of support.

D. EFFECT ON QUALITY OF REVIEW

The Committee is convinced that, in the administration of the larger funds appropriated for the National Institutes of Health, the quality of the reviewing process and the quality of the research supported have been maintained at a remarkably high level. The chief facts which can be cited in favor of the maintenance of a high quality of review are: (1) The quality of the reviewing groups has not changed. Their members continue to be selected from among the most outstanding scientists of the country. (2) The standards by which the quality of research is judged have certainly not decreased. This Committee believes that these are steadily rising. (3) The percentage of approvals of new research grant applications has been essentially constant for the past 2 years (table 12), averaging 48 percent in amount and 60 percent in number, and showed no significant change in the November 1959 and March 1960 study section-council cycles. Thus, it seems fair to say that the 36 percent increase in the National Institutes of Health budget for fiscal year 1960 over that for fiscal year 1959 did not result in any relaxation of the critical review

to which research applications have been subjected. However, the steady growth in the annual volume of applications resulted in an even greater total of approved applications, and the increased funds appropriated are still not sufficient to pay all the projects approved.

TABLE 12.—*National Institutes of Health: Approval and disapproval rates on new research grant applications,*[1] *June 1957–March 1960*

National Advisory Council meeting dates	Total amount (in thousands)	Approvals (in thousands)		Disapprovals (in thousands)	
		Amount	Percent of total	Amount	Percent of total
June 1957	$23,394	$12,214	52	$11,180	48
October 1957	23,148	12,238	53	10,910	47
February 1958	21,447	10,456	49	10,991	51
June 1958	24,479	10,728	44	13,751	56
October 1958	25,279	13,676	54	11,603	46
February 1959	28,986	15,211	52	13,775	48
June 1959	38,206	17,607	46	20,599	54
November 1959	35,888	16,892	47	18,996	53
March 1960	41,184	19,880	48	21,304	52
	Total number	Approvals		Disapprovals	
		Number	Percent of total	Number	Percent of total
June 1957	1,342	897	67	445	33
October 1957	1,229	820	67	409	33
February 1958	1,212	768	63	444	37
June 1958	1,339	800	60	539	40
October 1958	1,342	873	65	469	35
February 1959	1,510	943	62	567	38
June 1959	1,723	1,006	58	717	42
November 1959	1,644	961	58	683	42
March 1960	1,847	1,082	59	765	41

[1] Excluding deferrals, provisional approvals, and interim Council actions, such as special mail votes.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Division of Research Grants.

It is the Committee's judgment that the quality of the research proposals approved has steadily increased. The research training which investigators have received in recent years as house officers, fellows, trainees, and assistants on research grants is showing results in the research applications now coming to the National Institutes of Health. Many of these demonstrate the investigator's thorough acquaintance with the subject field and competence to utilize the newest developments of instrumentation and technique, and there is no dearth of interesting and original ideas. As the competence of the applicants has increased, so has that of the reviewing scientists, and the Committee be-

lieves that the standards by which the applications are judged have become more stringent. Because of the tremendous increase which has occurred in scientific knowledge and the great refinements in techniques and equipment which have been achieved in the past decade, many projects which were approved 10 years ago would not be considered worthy of approval today. Thus no conclusion can really be drawn from the lack of change in approval rate because improvement in quality and the more critical review may have compensated for each other. The judgment of the Committee represents a subjective, but very strongly held opinion.

Conclusion:

The increasing annual appropriations for the National Institutes of Health in recent years have been administered with maintenance of the same high standard of review which has been characteristic of that program since its inception. Furthermore, the Committee is convinced that the quality of the research supported has improved.

Chapter IV

STATUS OF MEDICAL MANPOWER

A. NUMBER OF PHYSICIANS

The United States is today facing a serious shortage of physicians and dentists in relation to its needs in all three aspects of medicine—teaching, research, and practice. This is true in spite of the fact that our physician/population ratio has remained essentially constant for the last 20 years (table 13), and although we have one of the highest ratios in the world, exceeded only by Israel and the Soviet Union (table 14).

TABLE 13.—*Supply of physicians and dentists: United States, 1930–59, with projections to 1975* [1]

Year	Physicians			Dentists
	M.D.'s and D.O.'s	M.D.	D.O.	
	Estimated number			
1930	164, 900	154, 600	10, 300	73, 100
1940	187, 600	175, 200	12, 400	81, 700
1950	216, 200	203, 500	12, 700	86, 900
1957	240, 300	226, 600	13, 700	97, 600
1958	244, 500	230, 600	13, 900	98, 540
1959	249, 100	235, 000	14, 100	99, 400
1965	274, 800	259, 900	14, 900	106, 700
1970	294, 900	279, 000	15, 900	112, 900
1975	312, 800	296, 100	16, 700	118, 100

Year	Population (in thousands)	Rate per 100,000 population			
1930	123, 188	133. 9	125. 5	8. 4	59
1940	132, 122	142. 0	132. 6	9. 4	62
1950	151, 683	142. 5	134. 2	8. 3	57
1957	171, 198	140. 4	132. 4	8. 0	57
1958	174, 064	140. 5	132. 5	8. 0	57
1959	177, 103	140. 7	132. 7	8. 0	56
1965	195, 747	140. 4	132. 8	7. 6	55
1970	213, 810	137. 9	130. 5	7. 4	53
1975	235, 246	133. 0	125. 9	7. 1	50

[1] At currently planned levels of school output.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service. *Public Health Reports*, vol. 75, No. 3, (March 1960), p. 278, table 2.

TABLE 14.—*Estimated number of physicians per 100,000 population, year 1956*

Israel	216/100, 000
Union of Soviet Socialist Republics	164/100, 000
United States	140/100, 000
West Germany	135/100, 000
Norway	117/100, 000
Denmark	115/100, 000
England and Wales	110/100, 000
Sweden	80/100, 000

Source: World Health Organization and Chancelleries in Washington, D.C.

The decline in number of physicians in medical practice has been mentioned above (table 9, p. 21). We should not forget that we have maintained our total physician/population ratio at its present level in recent years only by importing a large number of foreign-trained physicians. In 1959 approximately 8,400 foreign-trained physicians from 91 countries were serving in U.S. hospitals, representing 24 percent of the intern and resident staffs, and we would have great difficulty in maintaining many hospitals without them. In 1958 over 1,300 foreign-trained physicians were licensed in the United States representing 17 percent of the new physicians entering practice.

The Committee believes it is extremely unwise for this country to be forced to meet its need for doctors by such heavy reliance on foreign sources. As pointed out in the Bane committee report, "These figures raise the question of whether this country, with its wealth, should be dependent on other nations for a net inflow of physicians to serve our people, when there are so many urgent needs for medical service in other parts of the world. In no other field of education is there a situation in which the United States draws to the same extent on persons educated in other nations to maintain its high level of service."

Thus, at a time when the United States should be in a position to export physicians to help in the underdeveloped countries, as the Soviet Union is doing, we find ourselves unable to staff many of our own hospitals without borrowing medical personnel from abroad. Certainly they are most welcome; they should be given opportunities for training in this country, and the service they render is greatly appreciated, but the Committee believes that the country's dependence on them has been excessive.

The chief factors creating our present relative shortage of medical manpower are: (1) the tremendous increase in population that has occurred in the past 20 years, from 132 million in 1940 to 180 million in 1960; (2) the fact that we have not expanded our production of physicians at a sufficient rate to meet the growing requirement for medical care of the increasing population in addition to the augmented needs for teaching and research; (3) the shift in population distribution in the United States so that there is a greater percentage of the very young and very old who require the greatest amount of medical care; and (4) the demand for health services by our people resulting from our rising standard of living, the provision of hospital and medical insurance, and the increasing health-consciousness of our people.

The problem will grow and the number of physicians per 100,000 population will decline (table 13) unless we begin immediately to take energetic measures, as recommended in the Bane Report, leading to the training of more physicians and dentists. All sectors of medical activity—patient care, teaching, and research—will expand at less than an optimum rate until this central national problem can be solved.

Recommendation:

TRAINING OF ADDITIONAL PHYSICIANS AND DENTISTS

Measures should be initiated promptly to train greater numbers of physicians and dentists by implementing the recommendations of the Bane Report (p. 11).

B. RECRUITMENT OF MEDICAL STUDENTS

During the last 3 years, the number of college students applying to medical schools has dropped at a time when the number of college graduates has been increasing (table 15). Furthermore, the quality of applicants has decreased. These trends have occurred to a degree which constitutes a serious threat to the necessary increase in the number of physicians in the future.

TABLE 15.—*Medical school applicants*

Year [1]	Total degree-credit enrollment: aggregate United States [2]	College graduates (bachelor's and 1st professional degrees U.S. aggregate) [3]	Total number medical school applicants [4]	Number of medical school applicants as percent of college graduates
1948	2, 408, 249	366, 698	24, 242	6. 6
1949	2, 456, 841	433, 734	24, 434	5. 6
1950	2, 296, 592	384, 352	22, 279	6. 0
1951	2, 116, 440	331, 924	19, 920	6. 0
1952	2, 148, 284	304, 857	16, 763	6. 0
1953	2, 250, 701	292, 880	14, 678	5. 0
1954	2, 468, 596	287, 401	14, 538	5. 1
1955	2, 678, 623	311, 298	14, 937	5. 0
1956	2, 946, 985	340, 347	15, 918	4. 7
1957	3, 068, 417	365, 748	15, 791	4. 3
1958	3, 258, 556	[5] 390, 000	15, 170	3. 9

[1] Fall enrollment.

[2] U.S. Department of Health, Education, and Welfare, Office of Education. *Opening (Fall) Enrollment in Higher Education, 1958, Analytic Report*, Circular 545 (1959), p. 7, table 5, for the years 1948-58; *Opening (Fall) Enrollment in Higher Education, 1959, Institutional Data*, Circular No. 606 (November 1959), p. 1, table A, for the year 1959.

[3] U.S. Department of Health, Education, and Welfare, Office of Education. *Earned Degrees Conferred by Higher Educational Institutions, 1957-58*, Circular No. 570 (May 1959), p. 3, table 4, for the years 1948-57; *Projection of Earned Degrees to 1969-70*, Circular OE-54002 (September 1959), p. 5, table 2, for the years 1958 and 1959.

[4] American Medical Association, Council on Medical Education and Hospitals. *Medical Education in the United States and Canada, 1958-59*, (reprinted from the Education Number of the Journal of the American Medical Association, vol. 171 (Nov. 14, 1959), p. 1536, table 23.

[5] Estimated.

The main factors leading to the loss of popularity of medicine as a career are (1) the great length and cost of medical training; (2) the unbalanced situation in which Federal and non-Federal programs support Ph.D. candidates in the basic sciences while little support is available to medical students; (3) the fact that many other satisfying and intellectually stimulating career opportunities in science with high prestige and adequate financial reward have developed during the past 20 years and now attract the outstanding college graduates, whereas medicine had little competition in earlier years; and (4) a decrease in attractiveness of the image of the physician as viewed by high school and college students.

The financial problems of medical students can be indicated by the fact that 52 percent of all medical school graduates in the 1959 class were in debt to some degree, and 20 percent had indebtedness of $4,800 or more.[1] Medical school tuitions have continued to rise and the average cost of 4 years of medical school was found to be approximately $11,600 for those graduating in 1959. Scholarship support has been meager, students hesitate to shoulder a large loan, and the curriculum is so demanding that few students can carry a part-time job without considerable sacrifice of time needed for their studies. Thus the choice of medicine as a career has been to a considerable extent influenced by financial factors, and many promising college graduates who would have liked to study medicine have been discouraged.

The Federal Government now provides fellowships for every field of higher education in the sciences except medicine. During the coming year approximately 10,000 predoctoral fellowships in the physical, life, and social sciences, psychology, engineering, the arts, the humanities, and education will be awarded by four Federal agencies—the Department of State, the National Science Foundation, the Office of Education, and the National Institutes of Health.

These fellowships (1) give the graduate student free choice of the institution in which he will study; (2) they provide him a stipend of $1,800–$2,500 with a $500 allowance for each dependent, plus travel allowance; (3) they pay full tuition to the institution; and (4) in some instances they provide an additional subsidy to the institution.

In contrast, the Federal Government makes no fellowships available to medical students. Most medical schools offer some scholarship support to students in greatest need after the freshman year but, according to the Bane report, only 10 percent of medical students (or 2,960) held scholarships in 1958. These averaged only $500 in amount and most did not pay tuition.

The Ph.D. candidates in the basic sciences have another source of income available to them. Many obtain part-time jobs as assistants on research projects or laboratory assistants in the basic science departments. These jobs fit into their training and usually do not interfere with their progress toward a

[1] Association of American Medical Colleges, Education Research Service. *Datagrams*, vol. 1, No. 9 (March 1960) and unpublished data from the Association of American Medical Colleges.

degree. On the other hand, as indicated above, the medical school curriculum leaves little time for part-time jobs. Although many students do carry them in addition to working in the summer, they rarely earn as much by these efforts as the Ph.D. candidates.

Thus a career as a graduate student in the basic sciences offers financial security with good job opportunities available, both during the period of study and afterward, while a medical career offers longer years of work for a degree with high tuition and little or no financial support. Small wonder that fewer students are choosing medicine as a career!

The argument has frequently been offered that a medical student can look forward to such large financial returns as a practicing physician that he should be willing to go into debt, if necessary, to obtain a medical education. The same considerations are advanced in regard to dentists. This Committee wishes to emphasize that this is not true for the doctors and dentists who remain in academic careers, and believes that students oriented toward academic careers in these fields deserve support from the Federal Government equal to that now given to graduate students in the basic sciences. Such support can be provided in the form of scholarships for academically oriented students equivalent to the fellowship programs for graduate students in the basic sciences, or as loans which could be remitted if the individuals remain in academic life.

The outlook for the future need not be too discouraging. Within a few years the increase in birth rate which began in World War II will be reflected in a great wave of young people sweeping into the colleges and universities, and a rising number of college graduates will enlarge the manpower pool from which medical school applicants can be expected to come. If at the same time a greater effort can be made to present to young people in the high schools and colleges information concerning the opportunities for service, the challenge, satisfactions, and rewards of careers in the medical field, and if a more secure future can be offered to medical school applicants through scholarship and fellowship support, the number choosing medicine as a career can be expected to increase. Nevertheless, it will be a serious challenge to increase the number of medical school graduates by 3,600 a year by 1975, as recommended in the Bane Report. This can only be done if we start immediately on the expansion of our national medical educational capacity (see p. 12) and take steps to reduce the financial deterrent to the study of medicine.

Recommendations:

(1) **FINANCIAL AID TO MEDICAL STUDENTS**

The Federal Government should supplement private, industrial, and State sources in providing scholarship, fellowship, and loan assistance to medical and dental students interested in careers of teaching and research, as it now does to Ph. D. candidates in the basic sciences.

(2) **INFORMATION ON CAREERS IN THE MEDICAL SCIENCES**

Greater effort should be made through the schools and the various media of communication to inform more young people of the opportunities for service and the challenge, satisfactions, and rewards of careers in medicine, dentistry, and public health.

C. Manpower for Research

Physicians and dentists make up only about one-half of the professional personnel involved in medical research. A steadily increasing number of Ph. D. graduates and candidates in the physical and life sciences is being added to this group. The total manpower pool also includes personnel in the paramedical specialties and allied fields, technicians with various levels of training, and unskilled helpers in supporting roles.

The total potential manpower for research in the United States in the next 10 years should increase substantially. The great rise in number of college graduates which will occur when the students now in our primary and secondary schools begin to move through the colleges has already been mentioned. Thus the base from which to recruit our professional scientists seems secure. It should be recognized, however, that the number of medical, dental, and Ph. D. graduates is already fixed until 1963 by the number now enrolled in schools, and the number for 1964 by the number which will be enrolled next fall.

The percentage of physicians participating in teaching and research has been increasing slowly but steadily over the last 20 years, from less than 2 percent (3,349) in 1940 to 3 percent (7,931) in 1959, or 1½ times (table 10, p. 22). During that same period the national program in support of medical research increased from $45 million in 1940 to $715 million in 1960, or almost 16 times (table 2, p. 3).

Thus the number of physicians involved in research does not bear a close relationship to the funds which can be profitably utilized in the medical research program of the country, and the present need for more doctors is not a limiting factor in the further expansion of that program.

The importance of the research-trained doctors in medical research must be recognized, however. Their guidance and advice are essential at many points, and they carry the main responsibility in the area of clinical research through which the findings in the basic sciences are applied to the problems of disease in man. Each well-trained doctor plays a major role in the research

and training programs with which he is associated. Through great new advances in instrumentation, the support of ancillary personnel, and new organizational structures for research, the productiveness of the individual doctor has been greatly magnified. More are needed in medical research, but the present program can still be greatly expanded without adversely affecting medical practice or teaching.

An important study just completed by the Office of Education of the Department of Health, Education, and Welfare under the joint sponsorship of the National Institutes of Health and the National Science Foundation, but not yet published, shows the changes in graduate enrollment in the biosciences, physical sciences, psychology, and social sciences between 1953–54 and 1959–60 in 74 schools accounting for more than 90 percent of the total Ph. D.'s awarded in the sciences (table 16). These figures should be divided by a factor of 4 to give an approximation of the maximum annual number of Ph. D. graduates in these different fields through 1964. The increase in the total number enrolled in the science fields selected, from 32,482 in 1953–54 to 44,022 in 1959–60, is extremely encouraging.

TABLE 16.—*Trends in graduate enrollment in selected science fields at 74 schools,*[1] *1953–54* [2] *and 1959–60* [3]

Field	Number of schools		Number of graduate students enrolled		Increase in graduate enrollment 1953–54 to 1959–60	
	1953–54	1959–60	1953–54	1959–60	Number	Percent
Biosciences	70	72	7, 579	9, 312	1, 733	23
Preclinical	62	66	3, 270	4, 011	741	23
Other biosciences	67	68	4, 309	5, 301	992	23
Mathematics and statistics	71	72	2, 800	5, 866	3, 066	110
Physical sciences	72	72	11, 874	15, 711	3, 837	32
Psychology	65	65	4, 066	5, 359	1, 293	32
Selected social sciences	60	66	6, 163	7, 774	1, 611	26
Total of above	72	74	32, 482	44, 022	11, 540	36
Total, all other fields	72	74	71, 070	130, 203	59, 133	83
Total graduate enrollment	72	74	103, 552	174, 225	70, 673	68

[1] These 74 bellwether schools were selected because they consistently have accounted for better than 90 percent of total Ph. D.'s awarded in the sciences.

[2] The 1953–54 data are based primarily upon enrollment reported to the National Science Foundation and published in *Graduate Student Enrollment and Support in American Universities and Colleges 1954* (U.S. Government Printing Office, Washington, 1957). However, in some fields, and especially in the biosciences, National Science Foundation coverage in 1953–54 was incomplete. To obtain 100 percent reporting of 1953–54 enrollment in these 74 schools the National Science Foundation data were revised on the basis of information supplied by department chairmen in response to an inquiry from the Resources Analysis Section, Office of Program Planning, National Institutes of Health.

[3] The 1959–60 data are based on enrollment reported in the First Annual Survey of Enrollment for Advanced Degrees, Fall 1959, jointly sponsored by the National Institutes of Health and the National Science Foundation and conducted by the Office of Education.

The fact that the increase in the physical sciences (32 percent) and in mathematics (110 percent) is greater than in the biological sciences (23 percent)

reflects the rising demand in industry, defense, and space activities for trained manpower for the first named fields. Increasingly, medical research will also draw from this pool of trained mathematicians, physicists, and chemists.

However, in order to staff the greater number of medical schools which will be needed in the future and to help support the expanded medical research effort which is essential to the improvement in the health of the people, energetic measures should be taken to recruit more young people, into careers in the biological sciences and especially into the preclinical fields, as well as into medicine itself. These measures should include a variety of programs at the college and secondary school levels to bring the opportunities and challenges of medicine and the biosciences to the attention of young people at an early stage in their careers. Of prime importance would be an information program such as that recommended in the preceding section. The provision of part-time and summer jobs in research laboratories; training grants to improve college and secondary school teaching in the biological sciences; and scholarships for undergraduate science majors who show interest and talent in the biological sciences are all strongly advocated.

For supporting personnel requiring shorter periods of training, the potentialities are almost limitless. Industry can be expected to provide individuals displaced by a shortened workweek and increasing automation, many of them with considerable technical training, who would be interested in either full or part-time work in medical research. There will be increasing need for individuals with technical competence in electronics and engineering and these are now being trained in large numbers. There is also a large reservoir of women graduates of high schools and colleges which has remained largely untapped with little effort to interest them in medical research at either the professional or nonprofessional level.

Thus the Committee concludes that the manpower available is sufficient at both the professional and nonprofessional levels to support a substantial expansion in the medical research effort of the country. If vigorous efforts at recruitment and training and the construction of health educational facilities are initiated, the manpower available by 1970 should be ample for any program of medical research which may seem indicated.

Conclusion:

The need for more physicians and dentists should not be considered a limitation of the continued expansion of the health research effort of the country at this time. Ph.D. graduates and candidates, now making up approximately one-half of the total professional personnel engaged in health research, together with the support of personnel in the paramedical specialties, technicians, and others, assure an adequate manpower base for the continued growth of medical research. Moreover, the use of new instrumentation, techniques, and organizational structures for research can greatly magnify the productivity of the manpower available.

Chapter V

GOVERNMENT AGENCIES OTHER THAN THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Since the Committee was charged with consideration of "the funds provided by the Government for research in dread diseases," it has devoted the greater part of its deliberations to a review of the programs of the Department of Health, Education, and Welfare, and particularly that of the National Institutes of Health which Congress has made its chief instrument for the support of such research.

It has also surveyed the medical research programs of other Federal agencies which have health responsibilities and which carry out—or have the possibility of carrying out—research either directly or indirectly related to the attack on major disease problems. The level of support given to these agencies since 1957 has been presented in table 3, page 4. The contribution to the total Federal effort in the fight against disease and disability has been evaluated, as well as the extent to which that contribution could be increased.

It is appropriate and essential for any agency of the Federal Government having medical responsibilities for patient care to carry out research in relation to the problems of its patients. The Committee subscribes wholeheartedly to the belief that the continued association of physicians with an active research program is vital to the maintenance of the highest standard of medical care. Furthermore, the members believe it would be most unfortunate if the opportunities for research provided by the special circumstances affecting the personnel of these different agencies were not utilized. Thus, the unusual exposure to tropical diseases and other diseases of foreign countries to which members of the Armed Forces may be subjected provide special opportunities for study of the prevention and treatment of these conditions and for careful followup. Also, the closed populations of veterans hospitals and the complete and careful records kept on these patients permit unusually accurate epidemiological and statistical studies of various disease states.

Those Government agencies which have specific missions in the health field with research needs should have authorization and funds to support both intramural and extramural research in relation to their specific health missions. Where research on pertinent problems cannot be carried out in the intramural facilities of an agency, that agency should be empowered to award research grants or contracts and give sustained support to such studies by investigators in non-Federal research institutions. Support by such Federal agencies should

not be limited to projects which are clearly oriented toward the mission of the agency, but should include a proportion of basic research which may or may not eventually make a contribution to the needs of the agency or service.

Furthermore, the Committee believes it to be desirable to have more than one source within the Federal Government to which an investigator can apply for support of medical research.

Recommendation:

DIVERSITY OF FEDERAL SUPPORT FOR MEDICAL RESEARCH

Other Federal agencies besides the National Institutes of Health should continue to maintain strong programs in support of medical research. These programs should not only serve the specific health missions of these agencies and make their operations more effective but should also utilize their special opportunities to make contributions of particular value to the total medical research effort of the country. The agencies should be given the funds to support both basic and applied research and to sustain both in-service programs and strong extramural programs in support of medical research in non-Federal nonprofit research institutions.

A. DEPARTMENT OF DEFENSE

The medical services of the Army, Navy, and Air Force have been forced to operate under essentially level budgets for the past few years (table 17). The continuing inflationary spiral and the necessary salary increases for both professional and technical civilian help have imposed a gradual belt-tightening process until medical research productivity is being slowly but surely curtailed. Through skillful leadership and careful administration, standards have been maintained at a high level and outstanding research contributions have been made, but under increasing difficulties.

TABLE 17.—*United States Department of Defense medical research expenditures, 1957–61*

[In millions of dollars]

Fiscal year	Air Force	Navy	Army	Total
1957	4.8	4.5	13.7	23.0
1958	5.0	4.5	14.1	23.6
1959	4.4	5.2	14.6	24.2
1960	4.8	5.9	18.6	29.3
1961 (President's budget)	3.9	4.6	21.2	29.7

Source: Department of Defense, Office of Science, Defense Research and Engineering, Washington, D.C.

The Surgeon General of each of the three armed services presents and defends his budgetary request to the Research and Engineering Division of the Department of Defense and his needs are never heard directly by the Congress. Those who approve the medical share of the research and development dollars are not medically trained and therefore may not always understand fully the importance of medical research in support of the armed services.

Medical research in the Department of Defense is not a line item in the budget and represents only 0.0006 percent of the overall defense budget and 0.015 percent of the entire military research and development budget. The budget for medical research, therefore, fails to command attention, and it becomes difficult for responsible officials to remain informed and aware of the medical research needs of the armed services.

This Committee believes that the military medical research problems are in general so specialized and essential to the missions of the respective services that they should not be handicapped by budgetary limitations which do not even provide for the rising costs of research. Most research organizations have found that an increase of at least 5 percent a year is the price of just standing still. With the great new research opportunities being uncovered every day by new knowledge in the basic sciences, no medical research facility should be content to, or forced to, or allowed to, stand still.

The special problems of military medicine, such as the treatment of mass casualties in modern and conventional warfare, the prevention of contagious disease in large concentrations of troops, and the prevention and treatment of tropical diseases and other diseases of foreign countries in military personnel stationed abroad as studied under the Armed Forces Epidemiological Board, are extremely pertinent areas of research for the armed services. Funds for these purposes are easily justified in any budgetary consideration. The need for support of basic research less directly related to the immediate mission of the three services is more difficult to explain to those unfamiliar with the military programs but should not be neglected.

The medical research program of the Air Force is highly specialized in relation to problems of flight, and therefore almost all responsibility for research on disease prevention and treatment, except on those problems that have reference to acceleration, deceleration, altitude and long confinement in a closed chamber, have by agreement and custom been left to the medical services of the Army and the Navy. This Committee is primarily concerned with research on disease and therefore does not believe it appropriate to comment on the many excellent and interesting programs supported by the Air Force in the fields of basic biology and physiology in relation to flight or to make recommendations outside its field of responsibility. It therefore proposes to limit its discussion to those aspects of the hospital, inservice and extramural programs of the services which have direct bearing on the attack on major disease problems.

1. *Hospitals of the Armed Services*

The armed services have an obligation to military personnel to provide them with the highest standard of medical care possible. It is generally recognized that the attainment of such high standards in any hospital is greatly favored by the continued contact of its professional staff with an active program of medical research. The Committee has heard testimony that at present the severe limitation of funds and of professional and supporting personnel, both military and civilian, in military hospitals makes the maintenance of any research program exceedingly difficult.

The hospitals of the services represent a remarkably valuable and unique resource for certain kinds of medical research. They treat a controlled population on which accurate medical records are kept during military service. These records are retained in a central records file, are available for study if the individual returns to civilian life, and are incorporated into those of the Veterans' Administration if the individual later enters a Veterans' Administration hospital. Moreover, autopsies are performed on almost all military personnel dying in Armed Forces hospitals during peacetime. The Committee believes that the observation of the disease conditions and behavioral patterns which occur in members of the services and the evaluation of the preventive measures and therapy carried out in the best interest of the military personnel are important and essential functions of the medical corps of the three services.

The Armed Forces have a responsibility to the young physicians who must fulfill their period of obligatory military service. These men will subsequently make the greatest contribution to the services or to civilian medicine if they are allowed to continue their medical training to the greatest extent possible in the course of their assignments. Moreover, this period represents the best opportunity for the Armed Forces to recruit doctors for the regular medical corps, and the quality of the physicians who can be persuaded to stay in military service will depend in large part on the excellence of the research programs they observe while in uniform and on the research opportunities they can see in the years ahead. For the military hospitals to be good training centers, they must have strong research programs, and the Committee believes that many are far short of this goal at the present time.

2. *Military Medical Research Institutes*

The support of the specialized medical research institutes of the Army and Navy has been so limited in the past few years that they are falling far short of their potential contributions in basic and applied research to the special needs of the services and to the increase in knowledge of disease in general. The budgets for these institutes have not kept pace with the increasing costs of research owing to inflation, and this has necessitated a gradual reduction in staff, equipment, supplies, services, and maintenance to the point of diminishing returns. Outstanding scientists, deprived of adequate supporting personnel

and services, have resigned to take better supported research positions elsewhere. These fine facilities which have been built at the taxpayers' expense are not being utilized effectively at the present time; they are not adequately staffed; and funds are not available to maintain them in efficient working condition or to replace equipment which has become obsolete. Support is not now sufficient to permit more than token realization of their potential contribution.

It seems to the Committee that a relatively small investment in the research institutes of the services would yield a very large return in research productivity.

The organizational separation of some of these institutes from the clinical services with which most of them are geographically associated should not be allowed to prevent close cooperation between such facilities, the rapid application of new research findings, and the most efficient utilization of men and facilities.

An increasing deterrent to achievement of the full contribution of the research institutes is the growing shortage of trained manpower in the services. Young men can now fulfill their military obligation by coming into one of the services for 6 months immediately after high school or during or after college. The number of men enlisting with advanced training in the sciences who could contribute to the research programs in the research institutes or the hospitals has therefore decreased.

Another manpower problem arises from the fact that the number of officers in the medical corps bears a fixed relationship to troop strength and, as the size of the services has been decreased since the Korean action, so has the number of physicians in uniform. The number now permitted is not sufficient to meet the current demands for medical care, to undertake research in military hospitals, and to staff the research institutes as well.

The reduction in numbers of physicians, basic scientists, and technically trained men in uniform would not necessarily be a handicap if authorization and funds could be obtained to permit the employment of the required number of individuals with the needed experience and skills from civilian ranks, and at civil service salaries which would be fairly competitive with comparable jobs elsewhere.

At the present time, authorization and funds for more civilian positions in the inservice medical research programs of the Armed Forces are urgently needed. If the special research institutes are to function at their full potential, they need to be restored to their full staff complement with substitution of civilian for military personnel where necessary.

In the positions of leadership in the military research institutes, there must be careful consideration of the extent to which these can be staffed by regular military officers and of the extent to which they should be staffed by civilian scientists. In research programs, a large degree of continuity of administration is desirable and the frequent rotation of military officers makes this difficult.

The Committee believes that there should be greater use of the system of civilian research advisers to provide continuity where a department is headed by a military officer, and that, whenever the highest competence to head a

department cannot be found within the military, greater consideration should be given to the employment of outstanding civilian scientists under civil service, with the provision of more positions at the Public Law 313 level.

In short, the Committee concludes that there are wasted opportunities for research in both the military hospitals and the special research institutes of the services which can only be corrected by an increase in funds and in professional and supporting personnel for these installations.

3. *Extramural Programs*

The Armed Forces have failed to obtain support for their extramural programs in relation to the increase in costs of research, so that they can no longer support some projects which were extremely helpful to them in the past.

All three services have decreased their extramural programs to the minimum of applied research they believe to be necessary for their direct needs and of basic research which seems likely to be helpful to their missions in the future. To maintain the remaining projects in the face of rising research costs and inadequate basic budgets, they have become increasingly dependent on supplementary funds made available toward the end of the fiscal year. These have varied markedly. When supplementary funds have been obtained to support special projects, these have not been accompanied by any continuation funds in the budget, and it has been very difficult to finance a stable program on the uncertain expectation of such supplements. Some projects have had to be discontinued abruptly, although a terminal year is given whenever possible. Investigators are, however, becoming understandably reluctant to apply for or accept armed services support for any long-term project of medical research, since it may have to be placed on a terminal year basis at the next renewal, and such uncertainty is disturbing to the stable operation of a research program.

The Committee believes that the support of the extramural programs of the three services should be increased to a point at which projects considered of highest priority could be financed completely from their basic budgets with annual increases to take care of the rising costs of research.

Beyond that the services should have the funds to support a vigorous progressive program aimed at the solution of the major problems of military medicine, instead of being limited to what is largely a holding action at the present time. Opportunities do exist to solve some of these problems, but intensive research must be supported if they are to be realized.

The Advisory Panel on Medical Sciences to the Secretary of Defense recommended 3 years ago in April 1957 that the medical research budgets of the three armed services be doubled. In view of the large backlog of research needs which have not been met under the low budgets of the past few years, the Committee considers this to be a conservative estimate of the requirements of the Armed Forces.

4. *Liaison Between Government Agencies*

The Committee finds that the liaison between the three armed services and the National Institutes of Health could be improved. The administrative staff of the National Institutes of Health is not sufficiently aware of the research being sponsored through the intramural and extramural programs of the armed services, and the officers serving the extramural programs of the armed services are in general poorly informed about both the intramural and extramural programs of the National Institutes of Health. The practice of having representatives of the three armed services attend meetings of the National Institutes of Health study sections and councils is sound, but the individuals selected to represent the services have usually been chosen on the basis of competence in the subject reviewed by the particular advisory group, and often do not have any direct knowledge of the extramural research programs supported by their respective services. Furthermore, they are often poorly informed about the intramural program of their own services except for the part carried out in their own institutions.

The Committee would suggest that this could be corrected without great difficulty if the representative from the service to a National Institutes of Health study section or council were required to study the general content of the extramural and intramural programs of his service relating to the field of that specific advisory body with special attention to grants and contracts.

Since the advisory committees of the services are not as centralized as those at the National Institutes of Health, except for the commissions of the Armed Forces Epidemiological Board and the committees of the National Academy of Sciences-National Research Council which are used to a variable extent by the armed services, it is not practical for the National Institutes of Health to be represented in all the reviewing processes of the three services. Therefore, the National Institutes of Health must rely for information about military support of research pertinent to, overlapping, or duplicating research projects under consideration by their study sections, almost entirely on the Bio-Sciences Information Exchange.

Here it is disturbing to find that information about project applications to the services is not routinely forwarded to the Bio-Sciences Information Exchange until a final decision has been made, and that the services do not routinely consult the Bio-Sciences Information Exchange with regard to new research applications. It is quite possible today, therefore, for one investigator to have made an identical application to one of the services and to the National Institutes of Health and be paid by both without any possibility that the National Institutes of Health would learn about the duplication through the Bio-Sciences Information Exchange, one of whose functions is to forestall just such an eventuality.

In this connection it is encouraging to learn that more divisions of the services are planning to register their research programs with the Bio-Sciences Information Exchange and that the Navy and Air Force are now registering a large part of their intramural as well as their extramural programs. There is some indication that the Army may soon adopt the same policy.

The Committee believes that the Bio-Sciences Information Exchange is serving a very important role in centralizing and making readily available non-classified information on research in the biosciences, but it is dependent for its effectiveness on the completeness with which Federal and non-Federal agencies supporting research make information available to it. The Committee feels strongly that all Federal agencies should utilize and give full cooperation to this extremely valuable service.

Conclusions:

(1) The maintenance of a strong medical research program, both extramural and intramural and including basic as well as applied research is essential to the armed services for the achievement of the following goals:

(*a*) The acquisition of knowledge necessary for the specific missions of the three armed services;

(*b*) The maintenance of the highest standards of patient care for military personnel and their dependents in hospitals of the armed services;

(*c*) The advancement of medical knowledge through the utilization of the opportunities for good research observations under well-controlled conditions with unusual opportunities for follow-up which the hospitals of the armed services can afford. This is especially important in military hospitals in foreign countries where less familiar disease conditions may occur.

(2) The support of medical research through the Department of Defense has not been sufficient to fulfill adequately the purposes for which this support was given. The armed services represent an important resource for medical research which, primarily because of lack of funds and personnel, is being poorly utilized at the present time.

Recommendations:

(1) INCREASE IN APPROPRIATION FOR MEDICAL RESEARCH BY THE ARMY, NAVY, AND AIR FORCE

As recommended by the Advisory Panel on Medical Sciences to the Secretary of Defense 3 years ago, the appropriation for medical research in the armed services should be approximately doubled in order to permit the full utilization of the excellent facilities and opportunities for research available in military research institutes and hospitals.

(2) INCREASE IN NUMBER OF CIVIL SERVICE POSITIONS FOR THE DEPARTMENT OF DEFENSE

The three armed services should be authorized and provided with funds to employ in military hospitals and research institutes a larger number of civilian scientists and the necessary supporting personnel under civil service, including additional Public Law 313 positions.

(3) INCREASED STABILITY AND LEVEL OF SUPPORT FOR EXTRAMURAL PROGRAMS OF ARMED SERVICES

Sustained and expanded appropriations should be provided for more stable support of the extramural medical research programs of the armed services.

(4) USE OF BIO-SCIENCES INFORMATION EXCHANGE

The Committee urges all three armed services to give full cooperation to, and utilize the services of, the Bio-Sciences Information Exchange in providing and obtaining information on the support of research, and recommends that they register all research applications when received, as the National Institutes of Health, the Atomic Energy Commission, and the National Science Foundation have done so effectively.

B. VETERANS' ADMINISTRATION

The Committee wishes to give high praise to the Department of Medicine and Surgery of the Veterans' Administration for its determined effort in the face of a very limited budget to make the most of its research opportunities. The Committee believes that the Medical Director of the Veterans' Administration and his staff are well aware of the great research potentialities in their hospitals and that it is primarily lack of funds that prevents investigators in the Veterans' Administration program from making a much greater contribution to the attack on disease.

While it is true that the population of the Veterans' Administration hospitals is selected, in that it is primarily male and reflects predominantly certain age ranges, it is an enormous population which has been thoroughly studied over a number of years and with the most complete records available on any large population group. Moreover, their records are coded and can be subjected to rapid analysis to yield a tremendous body of data with a vast number of possible correlations. The follow-up agency of the Veterans' Administration centered in the National Academy of Sciences-National Research Council is well organized to obtain data on almost any type of follow-up study which might be desired. The Veterans' Administration is thus a vast resource in the study of the dread diseases, most of which affect the veterans as well as the civilian population.

The Committee believes that the Veterans' Administration cannot give the best possible medical care to the veterans without the existence of an active research program in its hospitals. This serves to provide a stimulating intellectual environment for the staff to keep them informed of new developments in medicine and to attract into the Veterans' Administration program the best type of well-trained young physicians.

The Veterans' Administration can make its potential contribution to the advancement of medical knowledge through the support of both basic and applied research in its intramural program and the full utilization of the very fine research opportunities provided by the patient population, records, and facilities in its hospitals.

In the opinion of the Committee, the Veterans' Administration should also have the authority to carry on an extramural program, as it did in years past, for the extension of research support to non-Federal institutions for studies on those particular problems and diseases which affect the greatest number of their patients. These would include aging, atherosclerosis, cancer, neurological diseases, mental health, etc., and also methods of improving hospital care.

One of the most difficult problems facing the Veterans' Administration is that some of its hospitals are too far removed geographically from any medical school to permit effective collaboration with a school under the supervision of a dean's committee. The staff in such a "rural" Veterans' Administration

hospital often feels isolated and out of the main stream of medicine. The Committee believes, however, that the establishment of better transportation, by special plane or helicopter if necessary, and better communication with a medical school, possibly by television, may in the near future establish effective medical school relationships for all Veterans' Administration hospitals.

The Committee would like to commend the Veterans' Administration for its very effective liaison with the National Institutes of Health study sections and councils, on which it is represented by well-informed members of Veterans' Administration hospital staffs or the central administration in Washington. The Committee also believes that the excellent cooperation given by the Veterans' Administration to the collaborative programs of the National Institutes of Health has been extremely helpful and productive.

Conclusion:

The present level of support of medical research in hospitals of the Veterans' Administration is inadequate to permit the full contribution that agency can make to research on the dread diseases.

Recommendation:

INCREASED APPROPRIATION FOR VETERANS' ADMINISTRATION

The appropriation for the Veterans' Administration program of medical research should be substantially increased for 1961.

C. NATIONAL SCIENCE FOUNDATION

The Committee finds the research supported by the National Science Foundation and the National Institutes of Health to be mutually complementary in the field of the life sciences and believes that the liaison between these two agencies is effective in minimizing undesirable duplication of effort.

One of the greatest needs for the continued growth of scientific research in this country is the training of additional manpower. The splendid support given by the National Science Foundation in recent years to graduate study in the basic sciences has helped substantially to increase our pool of trained manpower for research. The fact that the present support discriminates against medical students has been mentioned, and this Committee has recommended that this situation be equalized.

The various National Science Foundation programs designed to raise the quality of science teaching in our educational institutions from the colleges and universities down to the high schools are proving of remarkable value and represent one of the greatest forces active today for increasing the quality and quantity of scientific manpower of many types for the future.

D. ATOMIC ENERGY COMMISSION

The Committee is greatly impressed by the well-rounded program in radiobiology developed by the Atomic Energy Commission and can only hope it will continue to receive support in proportion to its needs and inevitable growth.

The contribution to our knowledge in radiobiology made by the Atomic Energy Commission and the research efforts of other Federal and non-Federal groups in regard to the biological effects of ionizing radiation, radiation protection, increasing resistance to radiation, and the development of therapeutic procedures to use after whole-body irradiation injury, will have a profound effect on military and civil defense planning. The close collaboration of the Atomic Energy Commission with the Department of Defense, the Office of Civil and Defense Mobilization, and the Division of Health Mobilization of the Bureau of State Services must be made even more effective in the future.

Greater consideration must be given to the effects of ionizing radiation in our peacetime environment, and the Committee hopes that the Public Health Service, in the study of reorgnization now in progress, will assure very close liaison with the Atomic Energy Commission for the administration of a program on environmental health. This will involve the cooperation of the Food and Drug Administration, the many divisions of the Bureau of State Services, and the National Institutes of Health in which research and control aspects of radiation protection are being carried out.

The educational program of the Atomic Energy Commission through support of special fellowships has played a major role in training investigators in isotope techniques and the entire field of radiobiology. These special fellowships should unquestionably be continued and increased in number, and the teaching of radiobiology in the medical schools, colleges, and universities, and even in the high schools, should be greatly strengthened.

Chapter VI

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, PUBLIC HEALTH SERVICE

The total support of medical research through the Department of Health, Education, and Welfare has increased in recent years from $138 million in 1957, when it represented 74 percent of the total medical research expenditures of the Federal Government, to $314 million, or 82 percent, in 1960 (table 3, p. 4). The shift in percentage distribution represents primarily the larger funds appropriated for the National Institutes of Health.

The Committee has concentrated its review on those activities of the Department of Health, Education, and Welfare which are most closely related to research on the dread diseases. Since the Public Health Service carries out 97 percent of the total medical research effort of the Department of Health, Education, and Welfare (table 18), the Committee has for the most part limited its study to that organization with special emphasis on the National Institutes of Health.

TABLE 18.—*Department of Health, Education, and Welfare: Expenditures for medical and health-related research, fiscal years 1958 through 1961*

[In millions of dollars]

	1958		1959 estimate		1960 estimate		President's budget, 1961	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Total, Department of Health, Education, and Welfare	179.7	100.0	236.3	100.0	314.2	100.0	332.1	100.0
Public Health Service	173.2	96.4	228.2	96.6	304.1	96.8	321.4	96.8
Office of Vocational Rehabilitation	3.6	2.0	4.6	1.9	6.3	2.0	7.8	2.3
Food and Drug Administration	1.7	.9	1.9	.8	2.1	.7	2.6	.8
Social Security Administration	1.2	.7	1.6	.7	1.7	.5	[1] .3	.1

[1] Incomplete figure.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Program Planning, Resources Analysis Section (January 1960).

The expenditures of the Public Health Service and its three divisions, the Bureau of State Services, the Bureau of Medical Services, and the National Institutes of Health, for medical and health-related research over the past 3 years are shown in table 19. It can easily be seen that the increase in Public Health Service expenditures from $173.2 million in 1958 to $304 million in 1960 has resulted almost entirely from the increase in appropriations for the National Institutes of Health.

TABLE 19.—*Public Health Service: Expenditures for medical and health-related research, fiscal years 1958 through 1961*

[In millions of dollars]

	1958		1959 estimate		1960 estimate		President's budget, 1961	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Total, Public Health Service	173. 2	100. 0	228. 2	100. 0	304. 1	100. 0	321. 4	100. 0
National Institutes of Health	157. 4	90. 9	209. 6	91. 8	283. 8	93. 3	297. 8	92. 7
Bureau of State Services	12. 0	6. 9	14. 5	6. 4	16. 3	5. 3	18. 8	5. 8
Bureau of Medical Services	1. 9	1. 1	2. 0	. 9	2. 0	. 7	2. 1	. 7
Office of the Surgeon General	1. 9	1. 1	2. 1	. 9	2. 0	. 7	2. 7	. 8

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Program Planning, Resources Analysis Section (January 1960).

The Public Health Service is at present engaged in an extensive internal reorganization in order to centralize closely related activities and prevent overlapping functions. The Committee has therefore considered that it would be inappropriate to comment on the programs of the Bureau of State Services and the Bureau of Medical Services at this time. Moreover, since research pertinent to the dread diseases supported by the Public Health Service is carried out almost exclusively by the National Institutes of Health, the activities of these other bureaus are of only peripheral concern to the Committee's survey.

Before turning to a consideration of the National Institutes of Health, however, the Committee would like to take cognizance of the increased emphasis being accorded to problems of environmental health in the reorganization of the Public Health Service and stress the great importance of that field.

Scientists are only beginning to be aware of the enormous role environmental factors are undoubtedly playing in the causation of disease. The foreign substances to which we have become increasingly exposed both internally and externally in the past 20 years have been with us too short a time to indicate what their long-term effects may be. It is safe to assume that not all of them will be good, and we must work hard to obtain knowledge about them before too much damage is done. At the rate new synthetic materials are being put

into use, a truly staggering research program is needed to keep pace. The problems of pollution of our atmosphere and water sources, the special hazards of ionizing radiation, and the complex questions of food additives, all require extensive research programs as a basis for the protective measures which must be introduced and for an understanding of the consequences these factors may have for disease in man. The increasing incidence of lung cancer and leukemia and the apparent increase in early coronary disease may possibly prove to be related to toxic factors with which man comes in frequent contact.

The Committee is therefore greatly concerned that, as a result of the present reorganization of the Public Health Service and the consideration of problems of environmental health by the Congress, an effective organizational structure be developed for the centralization and coordination of the Federal program of research on environmental health. Furthermore, this new pattern of organization should permit rapid application of research findings in this important field and should have authorization for control activities in relation to environmental hazards when necessary.

The tremendous problems of aging and the care of the aged will increase rapidly over the next decade. Research on the aging process and on diseases of the older age group must unquestionably receive greater attention. At present activities related to the health of the older members of our population are scattered in various divisions of the Public Health Service, and the Committee believes there is lack of an effective point of focus for their coordination.

As mentioned earlier, the only way in which medical care can be improved is through medical research and the application of research findings. The activities in the Public Health Service devoted to demonstration and application of research findings are already fairly extensive but, in the opinion of this Committee, they should be still further expanded.

Recommendations:

CHANGES IN ORGANIZATION OF PUBLIC HEALTH SERVICE

In the present study of the reorganization of the Public Health Service, urgent consideration should be given to—

(*a*) Effective centralization and coordination of the Federal programs of research on environmental health;

(*b*) Coordination of activities in progress in the various divisions of the Public Health Service pertaining to research on problems of aging and medical care of the aged; and

(*c*) Strengthening programs of demonstration and application of new research findings.

PART B.—FUTURE PROJECTIONS FOR THE FEDERAL PROGRAM IN SUPPORT OF MEDICAL RESEARCH WITH SPECIAL REFERENCE TO THE NATIONAL INSTITUTES OF HEALTH

Chapter VII

NATIONAL INSTITUTES OF HEALTH

The Committee has reviewed the organization, methods of operation, and the intramural and extramural research programs of the National Institutes of Health and wishes to add its praise to that of all the other professional groups which have studied this organization. The plan, relying on the scientists themselves to govern the disbursement of Federal funds for medical research and training, has proved on the whole remarkably sound, and Federal support through this channel has played a major role in the revolutionary changes in medicine of the past 15 years.

When it is realized that the support of medical research through the National Institutes of Health has been increased as a result of congressional appropriations from $8.4 million in 1947 to an estimated $284 million in 1960 (chart B and table 20), that this represents more than a 30-fold expansion since the immediate postwar period, and that the total budget for the National Institutes of Health has risen from $52.1 to $400 million in the past 10 years (table 21), we have some measure of the support which has been given to Investigators in the medical sciences through this arm of the Federal science program. The great increase in responsibility which has been placed on the National Institutes of Health for the wise administration of these funds has, in the opinion of this Committee, been carried remarkably well.

The success of the National Institutes of Health programs to date can in large measure be attributed to three factors: (1) The National Institutes of Health has been able to attract an unusually dedicated and capable group of people to fill its top positions; (2) the staff has been very wise and extremely careful to avoid any interference with the administration of the research institutions and with the individual investigators; and (3) the National Institutes of Health has been permitted sufficient flexibility to alter its structure and methods of operation in response to the changing demands of medical research. These three factors must continue to hold true in the expanded program which seems inescapable for the National Institutes of Health in the future.

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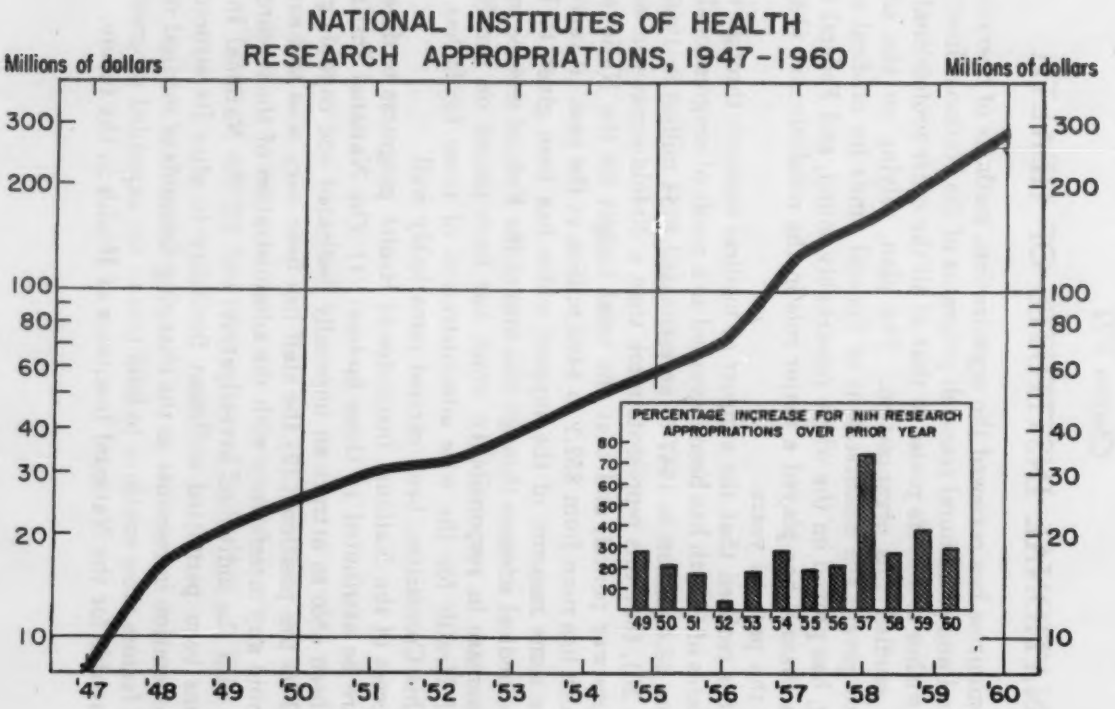
CHART B



Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Program Planning, Resources Analysis Section. .

TABLE 20.—*National Institutes of Health: Medical and health-related research appropriations, 1947–60*

[In millions of dollars]

Fiscal year	Total	Research grants	Intramural research and cancer chemotherapy contracts [1]
1947	8.4	3.4	5.0
1948	16.4	8.9	7.5
1949	21.2	10.9	10.3
1950	25.8	13.1	12.7
1951	30.4	16.8	13.6
1952	32.1	18.2	13.9
1953	38.2	20.4	17.8
1954	48.8	28.9	19.9
1955	58.8	33.9	24.9
1956	71.0	38.3	32.7
1957	125.2	89.7	35.5
1958	157.4	97.7	59.7
1959	209.6	141.5	68.1
1960	283.8	202.9	80.9

[1] Also includes field investigations and administration of research and research grants.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Program Planning, Resources Analysis Section (April 1960).

TABLE 21.—*National Institutes of Health: Appropriations, 1950–60*

[Figures in parentheses not added in totals]

	1950	1951	1952	1953	1954	1955
General research and services, NIH	$12,075,000	$14,313,900	$15,736,500	$16,598,750	$4,675,000	$4,675,000
National Cancer Institute	18,900,000	20,086,000	19,656,750	17,887,000	20,237,000	21,737,000
Mental health activities	[1] 8,666,000	9,505,000	10,561,727	10,895,000	12,095,000	14,147,500
National Heart Institute	10,725,000	14,200,000	10,082,650	12,000,000	15,168,000	16,668,000
Dental health activities	1,780,000	1,954,550	1,617,654	1,650,000	1,740,000	1,990,000
Arthritis and metabolic disease activities [2]				(4,568,900)	7,000,000	8,270,000
Allergy and infectious disease activities [2]				(5,475,200)	5,738,000	6,180,000
Neurology and blindness activities [2]				(1,537,300)	4,500,000	7,600,500
Total	52,146,000	60,059,750	57,675,291	59,030,750	71,153,000	81,268,000

	1956	1957	1958	1959	1960	President's budget, 1961
General research and services, NIH	$5,929,000	$12,122,000	$14,026,000	$28,974,000	$45,994,000	$47,260,000
National Cancer Institute	24,978,000	45,432,000	56,402,000	75,268,000	91,257,000	88,869,000
Mental health activities	18,001,000	35,197,000	39,217,000	52,419,000	68,090,000	67,563,000
National Heart Institute	18,898,000	33,396,000	35,936,000	45,613,000	62,237,000	63,162,000
Dental health activities	2,176,000	6,026,000	6,430,000	7,420,000	10,019,000	11,204,000
Arthritis and metabolic disease activities	10,840,000	15,885,000	20,385,000	31,215,000	46,862,000	47,541,000
Allergy and infectious disease activities	7,775,000	13,299,000	17,400,000	24,071,000	34,054,000	34,739,000
Neurology and blindness activities	9,861,000	18,650,000	21,387,000	29,403,000	41,487,000	39,662,000
Total	98,458,000	183,007,000	211,183,000	294,383,000	400,000,000	400,000,000

[1] Excludes $2,946,000 for support of narcotic hospitals at Lexington and Fort Worth which was subsequently transferred.

[2] The general research and services account included unidentifiable amounts in the initial years of the arthritis and metabolic disease activities, allergy and infectious disease activities, and neurology and blindness activities. Identifiable amounts are shown in the 1953 column for these activities in parentheses. Similarly amounts for the biologics standards activity for 1950–53 are not identifiable and are included in the direct research activity.

Source: U.S. Senate, Committee on Appropriations, Subcommittee on Departments of Labor, and Health, Education, and Welfare. *National Institutes of Health, Appropriations, 1950–60*, Committee Print (Jan. 6, 1960).

Conclusion:

The research grant, training grant, and fellowship programs of the National Institutes of Health over the past 15 years have constituted the most important single force in raising the standard of medical research, teaching, and practice in the United States to its present high level. It is of paramount importance that these programs receive support in proportion to the rate of growth anticipated.

The Committee does not propose to attempt a detailed analysis of the programs of the different institutes, but in the pages immediately following wishes to comment on present needs and future prospects of the National Institutes of Health and on those factors which appear essential for the sound growth of support of medical research and training.

A. ORGANIZATION AND ADMINISTRATION

1. *Institute Status for the Division of General Medical Sciences*

The activities of the Division of General Medical Sciences have grown and matured to the point that its future operation and consideration by Congress require more effective focus. Moreover, it needs a special advisory body which can devote full attention to its varied programs with members selected specifically for their potential contribution to the solution of the Division's problems.

Recommendation:

INSTITUTE STATUS FOR DIVISION OF GENERAL MEDICAL SCIENCES

The Division of General Medical Sciences should be raised to institute status by legislation paralleling the statutory authority of the National Heart Institute, with a name such as "The Institute of Experimental Medicine and Biology," and with its own council, thus relieving the National Advisory Health Council of the specific responsibility of advising in this field.

2. *Consideration of International Medical Activities of the National Institutes of Health*

The Committee believes that the National Institutes of Health must in the future play a much larger role in international medical affairs. There is not now, however, within the National Institutes of Health a sufficient staff or adequate organizational structure for expert consideration of all the problems relating to the activities of the institutes affecting foreign countries, foreign scientists, and international organizations.

Moreover, there is need for special review of foreign research grants by individuals conversant with all the special conditions of support of medical research and education abroad and with the repercussions which may result from the granting of U.S. funds to an investigator in a foreign country.

The Committee believes that the present staff of the Office of International Affairs should be enlarged and accorded appropriate recognition of the important role it will play in the foreign research program of the National Institutes of Health in the future.

Recommendations:

SPECIAL ADMINISTRATIVE UNIT FOR INTERNATIONAL ACTIVITIES

A special administrative unit should be established within the National Institutes of Health for the consideration of all problems relating to the international activities of that organization. This unit should also be responsible for the review of foreign research applications after they have been considered on the basis of scientific merit by the study sections and by the councils of the categorical institutes. It should be staffed by individuals with broad knowledge of the structure of support of medical research and education in foreign countries.

3. *Resources Analysis Section, Office of Program Planning*

The Resources Analysis Section of the Office of Program Planning under the Office of the Director, National Institutes of Health, was created in response to a report of the Senate Appropriations Committee on the 1958 appropriation which directed the National Institutes of Health "to strengthen its analysis of the Nation's total medical research resources."

The staff of this Section has made tremendous strides since 1958. It is now a remarkably authoritative and valuable source of information on the Nation's resources and requirements for medical and health-related research which the Committee found of great help in its present study.

The National Institutes of Health should be encouraged to maintain and strengthen the Office of Program Planning with special reference to the Resources Analysis Section. Moreover, with the increased interest and responsibilities of the National Institutes of Health in international medical affairs, an extension of this activity on an international basis seems desirable.

B. PERSONNEL

Extension of the research and research training activities of the National Institutes of Health has generated policy questions of great importance to medical research and medical education in the United States. The top staff of the National Institutes of Health must have the maturity, experience, and competence to recognize and deal with these questions effectively.

There are today many gaps in the administrative structure of the National Institutes of Health which it has been impossible to fill with highly qualified people. This is partly because the salary levels available either under civil service or in the commissioned corps for the top administrative and research jobs at the National Institutes of Health are no longer in good competitive relation to equivalent positions in acdemic institutions, and are far below salaries available in industry.

This is true notwithstanding the authorization under section 208(g) of the Public Health Service Act which permits payment of salaries under civil service of up to $19,000 per year for a limited number of specially qualified scientific and professional personnel.

Moreover, the dual personnel system under which the National Institutes of Health operates creates difficulties. The civil service system has been modified to attract outstanding people as indicated above. Under the commissioned officer system, however, the number of positions with salaries equivalent to the 208(g) positions, i.e., of general grade, is strictly limited by statute. As a result, competent commissioned officers who are asked to assume positions of heavy responsibility at the National Institutes of Health cannot be promoted in the commissioned corps to a grade warranted by the nature of the position. Since added responsibilities in these situations carry no added reward in terms of rank or salary, commissioned officers who are asked to assume these responsibilities are not given equal recognition to that accorded to their civil service counterparts. Many prefer not to accept the more demanding positions. The discrepancy is especially marked when a top position of responsibility is held by a commissioned corps scientist who does not have an M.D. degree and therefore is not eligible for the incentive pay advantage given to doctors, dentists, and veterinarians in the commissioned corps.

This situation could be rectified by a simple amendment to the section of the Public Health Service Act (sec. 214) which authorizes the detail of officers or employees of the Service to other organizations. A change in the law allowing assignment of a limited number of commissioned officers to the civil service system under a carefully designed and safeguarded plan would permit more effective use of the personnel of the Public Health Service.

The qualifications required for the top administrative and scientific personnel of the National Institutes of Health and for the institute directors, assistant directors, and division chiefs are so high that personnel for these jobs should be selected from the largest manpower pool possible. The Commissioned Corps of the Public Health Service is not large enough to provide men of outstanding ability for the National Institutes of Health and for the competing needs of the Bureau of Medical Services, the Bureau of State Services, and the Office of the Surgeon General.

Recommendations:

(1) INCREASE IN SALARY CEILING AND NUMBER OF POSITIONS FOR SPECIALLY QUALIFIED PERSONNEL

Section 208(g) of the Public Health Service Act should be amended to increase the salary ceiling for specially qualified scientists and professional personnel, and the number of such positions allotted to the National Institutes of Health should be raised substantially, and increased when urgently needed in the future.

(2) ASSIGNMENT OF COMMISSIONED OFFICERS TO CIVIL SERVICE POSITIONS

Section 214 of the Public Health Service Act should be amended to permit assignment of a limited number of commissioned officers to the civil service system in order to encourage competent officers to assume positions of heavy responsibility for which they cannot receive further promotion under the commissioned corps.

(3) RECRUITMENT OF TOP-LEVEL PERSONNEL FROM OUTSIDE THE PUBLIC HEALTH SERVICE

The National Institutes of Health should be encouraged to recruit its top-ranking personnel from outside the commissioned corps of the Public Health Service, as well as from within, in order to be able to select its leaders from the largest possible pool of outstanding scientists with both research experience and talent for administration.

C. SPACE NEEDS AND CONSTRUCTION

One of the most serious deficiencies in the operation of the National Institutes of Health is the lack of adequate office space for the most efficient operation of the present program and for the accommodation of personnel which will be needed in the expansion of the current activities and the development of certain new programs in the future. The present situation in which units of several institutes are scattered in rental space at a considerable distance from the National Institutes of Health campus is extremely expensive, wasteful of the time of consultants and staff, and deterrent to effective collaboration with other sections of the National Institutes of Health. This problem will be only partially remedied by the new office building now under construction. An additional office building is urgently needed.

The National Institute of Neurological Diseases and Blindness and the National Institute of Mental Health at present lack adequate space and facilities for their intramural programs, administration, and planning functions. Their administrative functions could be accommodated in the additional office building proposed, but a new building should be constructed to take care of the intramural research programs of these two institutes.

There is an urgent need at the National Institutes of Health for a facility which will make available to investigators the specialized equipment required by the techniques of physical biology. Such equipment is in general too costly to acquire for a single investigator who might use it only occasionally. The most logical arrangement is therefore to establish a central facility offering all types of equipment for these techniques which would be available for all investigators in the National Institutes of Health who have need of it. It is hoped that similar centers will eventually be constructed in relation to major medical research centers across the country.

If the National Institutes of Health is to play the role in international medical research which this Committee believes it must undertake on behalf of the United States, it should have on the campus a facility in which to house suitably the activities associated with its total international program, with space for working groups and conference rooms of various sizes, some equipped for simultaneous translation. Planning for such a building should begin immediately.

The large animal facility which was approved for the National Institutes of Health in the last session of Congress will prove an exceedingly valuable resource for the research investigators there. This project is expected to require 10 years for completion, but will begin to make its contribution within the next 2 years.

Additional construction urgently needed for which planning has already been completed includes: (1) alterations of animal quarters and the provision of cage washing facilities at the National Institutes of Health; (2) an addition to the clinical center cafeteria; (3) initial construction on the animal farm; and (4) research and animal facilities at Lexington, Ky.

The plans for the future of the National Institutes of Health also call for (1) an expansion of the master utility systems in fiscal year 1962 to supply the needs of new buildings to be constructed on the campus (planning funds are needed for this purpose in fiscal year 1961), and (2) an addition to the Division of Biologics Standards building in a few years for new animal quarters. which will release space required for laboratory activities.

Recommendations:

(1) ADDITIONAL OFFICE SPACE

The urgent need for additional office space should be recognized by authorization and appropriation of the funds for construction of an additional office building at the National Institutes of Health, so that all administrative groups now housed in rental space elsewhere can be brought into more effective relationship with the other segments of the National Institutes of Health with which they must work in close cooperation.

(2) RESEARCH BUILDING FOR THE NATIONAL INSTITUTE OF NEUROLOGICAL DISEASES AND BLINDNESS AND THE NATIONAL INSTITUTE OF MENTAL HEALTH

Funds should be appropriated in the fiscal year 1961 budget for the planning of a new building on the National Institutes of Health campus to serve the intramural research requirements of both the National Institute of Neurological Diseases and Blindness and the National Institute of Mental Health.

(3) PHYSICAL BIOLOGY BUILDING

Authorization should be granted for the construction of a physical biology building which would enable all investigators at the National Institutes of Health to utilize the new techniques of physical biology.

(4) INTERNATIONAL CONFERENCE CENTER

In order to facilitate the exchange of information between scientists of different countries and to support the role of the National Institutes of Health in international medical affairs, authorization should be granted for the planning of an international conference building for the National Institutes of Health. **(See pp. 96–97.)**

(5) ANIMAL FARM

Funds should be appropriated in fiscal year 1961 for initial construction, road improvements, fencing, and for designing and planning of future construction on the animal farm.

(6) OTHER CONSTRUCTION, ALTERATIONS, AND IMPROVEMENTS

Funds should also be appropriated in fiscal year 1961 for (*a*) alterations to the animal quarters at the National Institutes of Health for cage washing facilities and equipment; (*b*) an addition to the clinical center cafeteria; (*c*) research and animal facilities at Lexington, Ky.; and (*d*) for planning and designing the expansion of the master utility systems at the National Institutes of Health to accommodate the buildings to be constructed in the future.

D. INTRAMURAL RESEARCH PROGRAM

The intramural program of the National Institutes of Health has reached a size which is close to the maximum possible for effective operation, and which yet provides, within a convenient geographic radius, competence in all the fields of special knowledge and all the varied skills needed for a truly comprehensive research program on major disease problems. The careful review of the intramural research programs of the different institutes by their respective Boards of Scientific Counsellors is assuring the maintenance of high standards. The additional construction proposed above is needed to increase the efficiency of the present program.

The Committee wishes to pay special tribute to the clinical center at the National Institutes of Health which has so beautifully fulfilled original expectations. The concept of a center for a multidisciplined attack on major disease problems, supported by all the laboratory facilities and special equipment which modern medicine can provide, and with provision of all hospital costs for patients specially selected to further the research missions in progress, has proved to be sound and has served to accelerate progress toward the understanding and treatment of many disease states. The clinical center may be considered the prototype for the general clinical research centers to be described subsequently, although the latter will vary greatly according to the needs of the parent institutions.

Recommendation:

INTRAMURAL RESEARCH PROGRAM

The further growth of the intramural research programs of the National Institutes of Health should be qualitative rather than quantitative. The recruitment and retention of outstanding personnel are therefore essential. Funds will be needed to keep up with the rising costs of research, to provide major improvements in instrumentation and in communication of research knowledge and, in the future, to operate and staff the additional buildings under construction and those proposed.

E. EXTRAMURAL PROGRAM

1. *Research Grants*

On the basis of the experience of the past 15 years, there can be little doubt that new applications for research grants will continue to be received by the National Institutes of Health in increasing numbers and the problem of handling this increase in volume must be given careful consideration.

The excellent reviewing mechanism which has been developed has enlisted the participation of outstanding scientists from the entire country who consider service on the National Institutes of Health study sections and councils to be

an honor and a privilege, a truly educational experience, and a part of their responsibility as scientists. The burden of the increased number of projects to be reviewed, however, is approaching the limit which is reasonable to impose on the members of these advisory groups, on their parent institutions which lose their services while they are in Bethesda, and on the present administrative staff.

Measures must therefore be taken to handle the anticipated increase in volume of research applications through modifications of the present mechanisms and the development of new methods, if the high quality of review is to be maintained.

Recommendations:

(1) ADDITIONAL STUDY SECTIONS

Additional study sections should be established and some of the present study sections should be subdivided when necessary in order to distribute the increasing task of project review. Such subdivisions, however, should not exceed the limit compatible with a comprehensive view of a subject field by the members.

(2) INCREASE IN ADMINISTRATIVE STAFF

The administrative staff should be enlarged to keep pace with the growth in number of grant applications to be reviewed.

(3) NEW ADMINISTRATIVE PATTERNS FOR SUPPORT OF RESEARCH

In order to assure the effective utilization of the larger funds which will be required in the future, new administrative patterns for support of research must be developed. These should be employed according to the needs of the respective institutions.

(a) *Research Centers: General Clinical, Categorical, and Special Research Centers.* The development of clinical research centers, both categorical and noncategorical, and of special research centers based on a specific disease, approach, or resource, will unify the efforts of many investigators in a multidisciplined attack upon disease problems, and will constitute one of the most important opportunities for increasing the productivity of research.

(b) *Institutional Grants.* The return of the responsibility for allocating research and training funds to the research institutions and medical schools of the country in the form of institutional grants will provide greater freedom to the institutions in building up their research services, in stabilizing their research programs, and in establishing additional stable career opportunities.

(c) *Program Grants.* The Consolidation of a number of small grants of an established investigator into a single program grant with long-term support will assure greater stability for the investigator and simplify the requirements of central review.

2. *Training Grants*

Training grants provide one of the most effective mechanisms now in operation for adding to our pool of trained manpower for medical research. It takes several years to build up a training program to its full strength and level of efficiency; many of the current training programs are in their period of rapid growth, and new grants are being started. Therefore, a major increase in the funds required for these programs should be anticipated in the coming year. The best appraisal of the inadequacy of the present level of support is provided by the backlog of approved training grants for which funds will not be available during this fiscal year amounting to $14.3 million.

The training grants have been developed independently in the different institutes in response to very definite needs. They have therefore assumed remarkable variety, and there are now more than 40 different types of training support available through the National Institutes of Health. This is a confusing situation to all concerned.

Recommendations:

(1) INCREASE IN APPROPRIATION FOR TRAINING GRANTS

The appropriation for training activities supported through the National Institutes of Health should be substantially increased in fiscal year 1961 to help provide the trained manpower for teaching and research so urgently needed for the future.

(2) MEDICAL STUDENT RESEARCH TRAINING PROGRAM

A medical student research training program, based on the principles which proved so successful in the experimental training grants, should be established as a stimulus to, and an aid in the support of, research-oriented medical students and college science majors.

(3) CONSOLIDATION OF TRAINING PROGRAMS

The many different training programs should be consolidated, as much as is practicable, into a smaller number of varieties, bringing together under relatively broad guidelines those programs which are very similar in operation and function. The recent localization of responsibility for overall policy and for referral of training grant applications in a separate unit in the Division of Research Grants should prove to be of help in the effort to reduce the complexity of the training grant programs.

(4) ADJUSTMENT OF ALL TRAINING GRANTS TO FORWARD NOTIFICATION BASIS

Funds should be appropriated for fiscal year 1961 in the amount of approximately $23 million to complete the adjustment of both graduate and undergraduate training grants to a forward notification basis, with beginning dates in appropriate relation to the academic year. It should be emphasized that this does not impose any increase in total cost to the Government, but merely alters the time of payment.

3. *Fellowships*

The fellowship programs supported by the National Institutes of Health have made a remarkable contribution to the training of many of the outstanding young medical scientists of the country.

The principle of central review of applicants by outstanding scientists has served extremely well. The Committee believes, however, that the time has come when a part of the responsibility for the selection of fellows should be assumed by their parent institutions on the basis of thorough knowledge of the qualifications of the applicants.

New types of fellowships and increased support of certain fellowship programs should be provided as indicated below:

Recommendations:

(1) PARTICIPATION OF INSTITUTIONS IN THE SELECTION OF NATIONAL INSTITUTES OF HEALTH FELLOWSHIPS

A major portion of the responsibility for selection of fellows under the National Institutes of Health fellowship program should be transferred to the institutions in which the candidates have trained where the awards may be made on the basis of thorough knowledge of the qualifications and needs of the individual candidates.

(2) EXTENSION OF SENIOR FELLOWSHIP PROGRAM TO CLINICAL RESEARCH

Funds should be appropriated to permit extension of the senior fellowship program to include the field of clinical research.

(3) TRAINING FOR ACADEMIC CAREERS

Special fellowships should be provided at the postdoctoral level to support training for a career in academic medicine.

(4) PART-TIME FELLOWSHIPS

The appropriation for part-time fellowships should be increased to give encouragement to, and help provide greater support for, research-oriented medical students.

(5) INCREASE IN NUMBER OF FOREIGN RESEARCH FELLOWSHIPS

The foreign research fellowship program should be increased: (*a*) to permit a modest expansion in the total number of fellowships, (*b*) the inclusion of additional countries as training potential becomes evident, and (*c*) to allow renewal of fellowships for a second year when such extensions are approved by the original nominating committees in the foreign countries and the National Institutes of Health. The growth of this program should be consistent with maintenance of the present high standard of quality of the fellows.

4. *State Control Programs and Community Demonstration Projects*

The Committee believes firmly that all aspects of the Public Health Service program which involve communication and demonstration of the application of new research findings, both to practicing physicians and to the public, should be strengthened and increased.

5. *Collaborative and Cooperative Studies*

The terms "collaborative" and "cooperative studies," as used by the National Institutes of Health, both denote voluntary participation of all component groups, and the development of protocols and operational plans by the participants themselves.

Such studies are in general appropriate only at the applied or developmental end of the spectrum of medical research. They are not meant to substitute for the individual research projects of the investigators, but to complement them, and offer an opportunity to reach an answer more quickly by multiplying the answer one investigator could obtain in a given time alone by the efforts of additional investigators following the same criteria, so that an answer of statistical significance can be obtained within a reasonable time.

The National Institutes of Health currently has three collaborative studies in progress on (1) cancer chemotherapy, (2) psychopharmacology, and (3) the perinatal period. There are two cooperative studies: (1) The aneurysm study, in which the University of Iowa serves as the central processing unit, and (2) the anticoagulant study, in which the Massachusetts General Hospital serves in that capacity.

The cancer chemotherapy program was a pioneering effort without precedent in which it was necessary to experiment with administrative structures and methods of operation. In recent months the entire program has been subjected to intensive scrutiny by the administration and citizen advisers of the National Institutes of Health. On balance, the reviewing groups have concluded that the results of this engineered voluntary cooperative program have been equal to the original concept.

The psychopharmacology program is as yet too recent for fair evaluation. The perinatal program is being subjected to continued internal examination and will be modified in the light of the experience gained.

The consultants can conceive of many future situations in which such programs might have great and culminative importance in the conquest of disease. They therefore wish to commend the National Institutes of Health for initiative and foresight in the present instances, and for keeping these programs under continuous review.

Recommendation:

COLLABORATIVE PROGRAMS

Support of broad collaborative programs should be continued as an effective research technique and new programs should be started when a definite need can be demonstrated. The Committee commends the National Institutes of Health policy of subjecting these programs to continual internal review and periodic evaluation by appropriate groups.

F. HEALTH RESEARCH FACILITIES CONSTRUCTION

The health research facilities construction program, covered under a separate authorization from the rest of the National Institutes of Health, is infusing new life into the research programs of many medical schools, universities, hospitals, and research institutions, and its tremendous value has not been questioned. The need for such facilities is so great that the authority for teh act should definitely be extended.

The chief limitation on the submission of applications has been the difficulty experienced by many schools in raising matching funds. The Committee believes that the principle of matching funds is sound in that it promotes local interest in, and a sense of responsibility for, the facility constructed. The members recognize, however, that matching funds are much more difficult to raise for some schools and in some parts of the country than others and believe that, in situations in which there is a clear and urgent justification for the construction of research facilities, funds should be allocated with some modification of the matching requirement as considered necessary by the National Advisory Council on Health Research Facilities.

Difficulty has also been encountered in differentiating research from research training and teaching in the applications for construction funds. An amendment to broaden the act to include multipurpose facilities construction, when the teaching and research training proposed are directly connected with the research to be carried out, would greatly simplify the administration of the act and permit more economic planning on the part of the applicant institutions. It would also recognize the desirability of flexible use of space and the impossibility of completely divorcing research from research training and teaching. The number of applications for such multipurpose facilities would be expected to exceed considerably that for research facilities alone.

Recommendations;

(1) EXTENSION OF AUTHORIZATION OF HEALTH RESEARCH FACILITIES CONSTRUCTION ACT

The authorization for the Health Research Facilities Construction Act should be extended for a minimum of 5 years beyond its present expiration date.

(2) MODIFICATION OF MATCHING REQUIREMENT IN EXCEPTIONAL CIRCUMSTANCES

In situations in which there is a clear and urgent justification for the construction of health research facilities for which full matching funds cannot be obtained, consideration should be given to modification of the matching requirement.

(3) MULTIPURPOSE FACILITIES CONSTRUCTION

The Health Research Facilities Construction Act should be amended to include multipurpose facilities for research, research training, and health education when the construction is primarily for research and the educational activities are closely related to the research program.

(4) HEALTH EDUCATIONAL FACILITIES CONSTRUCTION

The Committee also endorses pending legislation which would amend the Health Research Facilities Construction Act to authorize a 10-year program of grants for construction of medical, dental, and public health educational facilities. **(See Health Educational Facilities Construction, pp. 98–99.)**

Chapter VIII

GENERAL CONSIDERATIONS IN PROJECTIONS FOR THE FUTURE

In approaching the problem of adequate budgetary levels in the immediate and more distant future for the Federal program in support of medical research, the Committee has been governed by the recognition that the people of the United States have indicated through their Congress and their voluntary contributions that they truly desire a full-scale attack against the major causes of disease and disability, that they do not wish a lack of funds to delay the answers which can be obtained, and that they are, therefore, willing to support the development of a much more powerful program of medical research than that in operation today. If these premises are accepted, the following considerations seem inescapable:

(1) The level of medical research expenditures each year from Federal and non-Federal sources combined should be sufficient to give adequate support to all research judged to be of high quality and potential productivity by competent scientific advisers after careful and critical review.

(2) Adequate support of such research will require the provision of facilities which will permit the utilization of the new knowledge, equipment, and methods developed by investigators in the physical sciences. Special resource centers must be established on a regional basis which will provide access to electronic and nuclear equipment, data-processing machines, greatly expanded library and communications centers, and specialized animal facilities both to provide the needed types and numbers of animals and to permit such special kinds of experimentation as sterile animal research.

The renovation and new construction of health research facilities and the provision of the full range of research resources appear at present to be among the most urgent requirements for strengthening the base of our medical research program. The need is so great that the development of these facilities should not be delayed by rigid matching fund requirements. The present Federal support of health research facilities construction at a level of $30 million per year is quite out of proportion to the construction requirements of a national medical research effort which is expected to total $715 million this year. The provision of the facilities needed will represent a major capital investment.

(3) There must be a vigorous campaign to increase the number and the degree of training of scientific and supporting personnel for medical research. Intensive recruitment and training efforts will therefore be necessary in medicine and the biological sciences. The financial deterrent to a medical career

must be countered by scholarship and fellowship support, and the health educational facilities must be constructed to permit the expansion in health eduction capacity which the country will require.

(4) New methods for undertaking research must be developed. The methods and organizational patterns utilized for research in the past will not be adequate for the needs of the future. As the basic sciences have tended to merge at their boundaries and have come to contribute so importantly to medical research, the need for inclusion of representatives of many scientific disciplines in a concerted, multidisciplined attack on disease problems becomes ever more compelling. Special centers must be established to facilitate this kind of approach.

(5) Better methods for supporting research should be developed to assure the maximum of stability and freedom of action both to the institutions and to the individual investigators.

The Committee has considered the economic and manpower resources of our country in relation to the future support of an expanded program of medical research and can see no reason for pessimism over the next decade, barring the occurrence of another war.

These resources were carefully evaluated by the Bayne-Jones committee in 1957–58 and served as the basis for its projection of a total national medical research expenditure of $1 billion by 1970. The reader is referred to the report of that committee for an excellent discussion of these resources. Three factors were underestimated in its projections, however, which can be more accurately evaluated today.

(1) The Bayne-Jones committee recognized that the figures available for medical research expenditures in 1957, the year it selected as the base for projection, were not quite complete and that its projection was probably conservative. It now appears that the value used was approximately 17 percent below the actual level of medical research expenditures for 1957, and the projection made was therefore considerably lower than it should have been.

(2) It was assumed that the proportion of total national expenditures for research and development devoted to medical research would remain constant. This did not take into adequate account the increasing health-consciousness of the American people as expressed in the great expansion in voluntary health and hospital insurance programs, increased demands for assured medical care of the aged, and the growing expectation that the support of medical research will lead to a decrease in disease and disability. Thus, the percentage of total research and development expenditures devoted to medical research has increased from 4 percent in 1957 to 5.3 percent (estimate) in 1960 (table 22).

TABLE 22.—*Growth of Federal program in support of medical and health-related research and National Institutes of Health budget, 1950–60*

[In billions of dollars]

Fiscal year	Gross national product [1]	National research and development [2]		National medical research [3]		Federal medical research [3]		NIH medical research [3]		NIH [4]
		Amount	Percent of gross national product	Amount	Percent of national research and development	Amount	Percent of national medical research	Amount	Percent of Federal medical research	Budget
1950	284. 6	2. 9	1. 0	0. 148	5. 1	0. 060	40. 5	0. 026	43. 3	0. 052
1951	329. 0	3. 4	1. 0	. 163	4. 8	. 073	44. 8	. 030	41. 1	. 060
1952	347. 0	3. 8	1. 1	. 173	4. 6	. 079	45. 7	. 032	40. 5	. 058
1953	365. 4	5. 2	1. 4	. 203	3. 9	. 096	47. 3	. 038	39. 6	. 059
1954	363. 1	5. 6	1. 5	. 225	4. 0	. 107	47. 6	. 049	45. 8	. 071
1955	397. 5	6. 4	1. 6	. 240	3. 8	. 118	49. 2	. 059	50. 0	. 081
1956	419. 2	8. 5	2. 0	. 285	3. 4	. 135	47. 4	. 071	52. 6	. 098
1957	442. 5	10. 0	2. 3	. 397	4. 0	. 186	47. 0	. 125	67. 0	. 183
1958	441. 7	11. 2	2. 5	. 491	4. 4	. 227	46. 0	. 157	69. 0	. 211
1959	478. 8	12. 4	2. 6	. 587	4. 7	. 291	50. 0	. 210	72. 0	. 294
1960 (estimated)	500. 0	13. 5	2. 7	. 715	5. 3	. 380	53. 0	. 284	75. 0	. 400

[1] Executive Office, *Economic Report of the President transmitted to the Congress, January 20, 1960.*

[2] Department of Defense, Office of the Secretary of Defense. *The Growth of Scientific Research and Development, July 27, 1953,* for the years 1950–52.

National Science Foundation. *Reviews of Data on Research and Development,* for the years 1953–60.

[3] Department of Health, Education, and Welfare, National Institutes of Health, Office of Program Planning, Resources Analysis Section.

[4] U.S. Senate, Committee on Appropriations, Subcommittee on Departments of Labor, and Health, Education, and Welfare. *National Institutes of Health Appropriations, 1950–60,* Committee Print (Jan. 6, 1960).

(3) The assumption was made that the gross national product, the total of all expenditures for goods and services, would rise at an average rate of 3 percent per year which is probably too low. During the past 10 years, the gross national product has increased at an average rate of 3.2 percent per year. The estimation of its growth in the future is fraught with many uncertainties, but many leading economists have stated that by present indications it should increase at a more rapid rate than in the past. With our expanding population, the great increase in the labor force which will occur in the next decade, the increasing productivity possible through the application of automation in industry and agriculture, the contributions of scientific research and the introduction of new machines and methods which will save time, effort, and money, we shall in all probability see a rise in the gross national product to 4 or 5, or even 6 percent per year. Whether one accepts a figure of 4 or 6 percent, the projected increase seems certain to provide a much broader base from which to obtain the funds for a greatly expanded medical research program in the future.

The projection of the Bayne-Jones committee can therefore no longer be considered valid, although the philosophy on which it was based was sound.

The $1 billion level of support for the medical research program of the Nation is likely to be reached much earlier than 1970.

The limitations on scientific manpower for medical research over the next 5 years have been discussed earlier (p. 36), and the conclusion was reached that (1) with the increase in numbers of M.D. and Ph. D. scientists who will become available for careers in medical research during this period; (2) with increasing opportunities for stable and satisfying careers in teaching and research which will attract more of these trained scientists into the field of medical research; (3) with a substantial increase in the number and degree of training of supporting personnel; and (4) with a great increase in the productivity of the individual investigator through new organizational patterns of research and the provision of the necessary research resources, the manpower available for medical research now and in the next 5 years will be sufficient to staff a major expansion of our medical research effort.

It should be emphasized that nothing we can do today will increase the number of M.D. and Ph. D. graduates beyond those already enrolled until 1963. Only if adequate attention is given to the stimulation of interest of high school and college students in the fields of medicine and the biosciences; if the challenge, satisfactions, and rewards of careers in these fields are well presented; and if adequate financial support is provided for medical students, may we look forward to a substantial rise in the number of college graduates applying for medical school and postgraduate training in the biosciences which could begin to be reflected in the number receiving degrees after 1963. By 1970 the number could be substantially increased.

The Resources Analysis Section of the Office of Program Planning, National Institutes of Health, has prepared an interesting chart showing past expenditures for medical research through the National Institutes of Health for 1947–59, and alternative projections for 1960–70 (chart C) based on different assumptions as to the growth of our economy, the percentage of our gross national product devoted to research and development, the percentage of that amount allocated to medical research, and the share supported by the Federal Government and the National Institutes of Health.

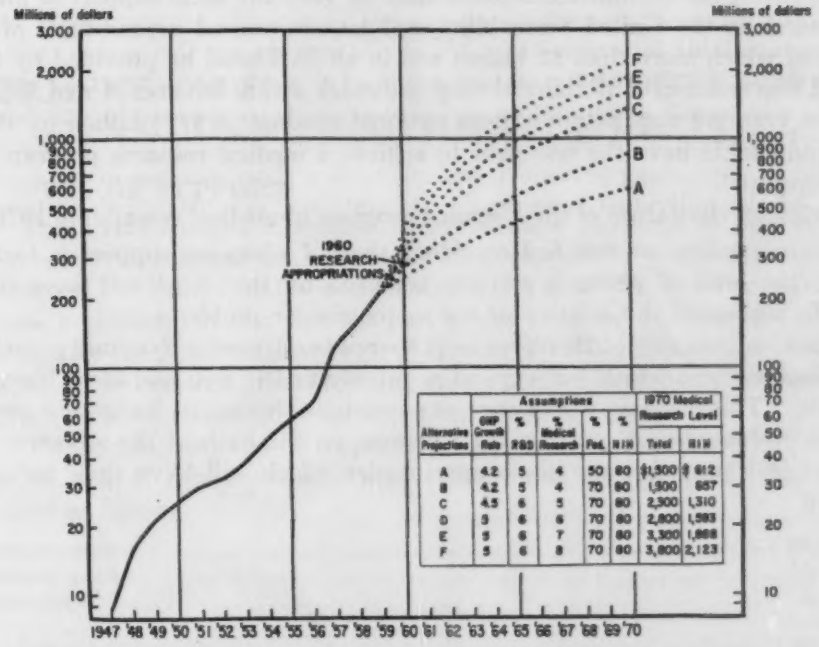
The curve which will actually be followed in the future will depend very largely on the decisions made now and in the years ahead regarding manpower and facilities. These decisions will be influenced by the intensity of the people's demand for better health through research and by the promise of significant breakthroughs which will arise.

The actual budgetary requirements for the future will depend very largely on the present status of medical knowledge which will be the base for new advances and on the steps taken now for the recruitment and training of manpower and the construction of facilities.

Our store of medical knowledge has grown at a staggering rate in the past 20 years and its foundations have been greatly strengthened by the contributions of the basic sciences. The present base seems sufficiently sound to support a major expansion of research effort.

CHART C

NATIONAL INSTITUTES OF HEALTH RESEARCH EXPENDITURES 1947-59
AND ALTERNATIVE PROJECTIONS, 1960-1970



Alternative Projections	Assumptions: GNP Growth Rate	% FBS	% Medical Research	% Fed.	% NIH	1970 Medical Research Level: Total	NIH
A	4.2	5	4	50	80	$1,500	$ 612
B	4.2	5	4	70	80	1,300	657
C	4.5	6	5	70	80	2,300	1,310
D	5	6	6	70	80	2,800	1,593
E	5	6	7	70	80	3,300	1,868
F	5	6	8	70	80	3,800	2,123

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Program Planning, Resources Analysis Section (December 1959).

Assuming that energetic measures are taken promptly to increase our manpower and facilities for medical research, and to support the greatly expanded program possible within our present limitations of manpower and facilities, the Committee foresees the need for much greater Federal appropriations, the greater part of which would be channeled through the National Institutes of Health. Confidence is expressed in the ability of the staff of that organization to administer these larger appropriations wisely. Major infusions of funds into the Federal program through the National Institutes of Health in the past have been readily absorbed and have resulted in a great increase in research potential and performance. There is every reason to expect that this will continue to hold true in the future.

Science, however, has a habit of turning corners, suddenly revealing new horizons which could not have been imagined weeks, or even days, before. The dimensions of the new opportunities awaiting us cannot now be estimated with any accuracy. They may result in major increases and, eventually, in great reductions in the budgetary needs for research. Consequently, the Committee believes that, while alternative projections of future growth provide a useful framework for considering long-range policies, specific projections beyond the year immediately ahead are extremely uncertain, are apt to be misconstrued

as limitations or targets, and impose on any report a kind of built-in obsolescense. It has accordingly limited the scope of its recommendations in the sections to follow.

However, the Committee believes that by 1970 the total support of medical research in the United States may well require annual expenditures of $3 billion, of which more than $2 billion will in all likelihood be provided by the Federal Government. If the economy grows at a rate between 4 and 5 percent per year, we may attain a gross national product of $775 billion by that time, and should have the resources to achieve a medical research program of this magnitude.

Although the nature of the Nation's program of medical research in 1970 is difficult to predict, we can feel confident that, if adequate support is forthcoming, the level of research activity achieved by that time will have substantially advanced the solution of our major disease problems.

The Congress should therefore be prepared to support a dynamic program of medical research which will expand as rapidly as the men and ideas become available. This program will change so unpredictably that its budgetary needs must be evaluated each year by the Congress on the basis of the advances of the year just past and the new opportunities which will have then become apparent.

Chapter IX

COMMENT ON FISCAL YEAR 1960 BUDGET FOR THE NATIONAL INSTITUTES OF HEALTH

A. LEVEL OF SUPPORT

The Committee of Consultants on Medical Research is convinced by abundant evidence that not only is the total support for medical research and training in the United States inadequate for the most effective attack on major disease problems, but also that the part of this support provided by the appropriation for the National Institutes of Health of $400 million [1] is insufficient to pay all of the research grant, training grant, and fellowship applications which will have been recommended for approval in this fiscal year.

The current estimate of applications that will be approved, but not paid due to lack of funds in fiscal year 1960, totals approximately $23 million divided as follows:

Research grants	$3, 000, 000
Training grants	14, 300, 000
Fellowships	5, 500, 000
Total	22, 800, 000

This amount should be considered in relation to an unprogramed reserve of $5,865,000 (table 23).

TABLE 23.—*National Institutes of Health: Analysis of total unprogramed reserve,[1] fiscal year 1960*

National Institutes	Grants	Chemotherapy contracts	Intramural research	Review and approval	Professional and technical assistance	Unprogramed reserve as of Apr. 18, 1960
Cancer Institute	$2, 500, 000	$1, 000, 000	0	0	0	3, 500, 000
Heart Institute	0	0	0	$50, 000	0	50, 000
Arthritis and Metabolic Diseases	1, 000, 000	0	0	50, 000	0	1, 050, 000
Mental Health	0	0	$40, 000	70, 000	$15, 000	125, 000
Neurological Diseases and Blindness	1, 000, 000	0	60, 000	80, 000	0	1, 140, 000
Total	4, 500, 000	1, 000, 000	100, 000	250, 000	15, 000	5, 865, 000

[1] As of Apr. 18, 1960.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Administrative Management, Financial Management Branch (April 1960).

[1] Not including $30 million for health research facilities construction.

B. UNPROGRAMED RESERVE

At the time the final apportionment of funds for fiscal year 1960 was made in September, several of the institute directors could not be sure they would be able to allocate within the fiscal year all the funds appropriated. Therefore, until their needs could be determined, they agreed to set aside from the appropriation for "Research grants" an unprogramed reserve in the amount of $4,500,000 to be held by the Bureau of the Budget. This was divided among the different institutes as shown in table 23. In addition, the sum of $1,365,000, including $1 million of the funds for cancer chemotherapy contracts, was set aside from the appropriation for "Direct operations," making a total unprogramed reserve of $5,865,000.

It now appears that these were fairly good estimates for the institutes which set aside unprogramed reserves, and the appropriation approved by the Congress for research grants for these institutes was in fairly close approximation to the need. The appropriations for some of the other institutes was not sufficient, however, and it is now estimated that the total appropriation for research grants will be $3 million short of the amount needed to pay all approved applications (table 24).

TABLE 24.—*National Institutes of Health: Extramural programs, fiscal year 1960*

National Institutes	Appropriation	Unprogramed reserve [1]	Estimated amount of unpaid approved applications [1]
TRAINING			
Division of General Medical Sciences	$13,040,000		$4,200,000
Cancer Institute	7,205,000		0
Heart Institute	8,679,000		387,190
Allergy and Infectious Diseases	3,621,000		162,785
Arthritis and Metabolic Diseases	6,298,000		1,512,513
Dental Research	1,100,000		69,769
Mental Health	26,206,000		7,670,922
Neurological Diseases and Blindness	8,888,000		297,805
Subtotal	75,037,000	0	14,300,984
FELLOWSHIPS			
Division of General Medical Sciences	5,310,000		2,555,270
Cancer Institute	1,912,000		840,933
Heart Institute	2,663,000		107,878
Allergy and Infectious Diseases	1,066,000		1,125,251
Arthritis and Metabolic Diseases	437,000		575,000
Dental Research	650,000		173,297
Mental Health	1,996,000		0
Neurological Diseases and Blindness	536,000		67,319
Subtotal	14,570,000	0	5,444,948
RESEARCH GRANTS			
Division of General Medical Sciences	23,559,000		754,000
Cancer Institute	37,818,000	[2] $2,500,000	0
Heart Institute	36,468,000		998,000
Allergy and Infectious Diseases	21,569,000		140,000
Arthritis and Metabolic Diseases	31,818,000	1,000,000	420,000
Dental Research	4,476,000		109,000
Mental Health	23,482,000		301,000
Neurological Diseases and Blindness	24,484,000	1,000,000	262,000
Subtotal	[3] 203,674,000	[4] 4,500,000	2,984,000
Total	293,281,000	4,500,000	[5] 22,729,932

[1] As of Apr. 18, 1960.

[2] The National Cancer Institute has an additional unprogramed reserve of $1,000,000 in chemotherapy contracts in "Direct operations."

[3] Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Division of Research Grants.

[4] See table 23 for the total unprogramed reserve of the National Institutes of Health.

[5] Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Office of Administrative Management, Financial Management Branch.

The chief difficulty is that the funds in the unprogramed reserve are earmarked for particular Institutes and specific programs and are therefore unavailable to the Institutes and to the programs most urgently in need of additional funds for research grants. Moreover, they cannot be applied against the $5.5 million deficit for fellowships and the $14.3 million deficit for training grants.

C. ADJUSTMENT OF TRAINING GRANTS TO FORWARD NOTIFICATION BASIS

It has been recognized for some time that the training grant programs of all of the Institutes should have been initiated on an advance notification basis in relation to the academic year so that the personnel planning, both for teachers and trainees on training grants, could be carried out most effectively. This concept is well understood by the Department of Health, Education, and Welfare and by the Bureau of the Budget. Agreement was accordingly reached in the summer of 1959 to remedy this difficult situation over a 3-year period by setting aside a portion of the training grant funds in each of these 3 years and applying it to the adjustment of continuation training grants on a forward notification basis. Accordingly, $8 million was utilized for this purpose in fiscal year 1960, and the balance of the sum required was expected to be made available from the appropriations for fiscal years 1961 and 1962. No allowance for this purpose has been made, however, in the administration budget for fiscal year 1961.

If undergraduate training programs are included, the total additional amount needed to bring all continuation training grants onto a forward notification basis would be $22,700,000.

It should be clear that this adjustment does not really represent any increase in Government expenditures for these approved training programs, but merely advances the date of payment to permit more efficient utilization of funds. This therefore represents a nonrecurring item which, once paid, will not appear in the budgets of future years.

The Committee, therefore, is unable to reconcile the situation outlined above with the statement in the President's budget message in January that "the 1960 appropriation of $400 million for the National Institutes of Health will not be entirely committed this year, even with advanced funding of certain training programs."

Chapter X

FURTHER DEVELOPMENT OF THE PRESENT PROGRAM OF THE NATIONAL INSTITUTES OF HEALTH

A. INTRAMURAL PROGRAM

1. *Direct Operations*

A moderate increment in funds of approximately $11.4 million for the intramural research program, for the Clinical Center, and for the other items listed under Direct Operations is required to cover factors such as the increasing costs of research and its supporting services, the need to purchase new and more expensive equipment, the increased cost of review and approval of a larger volume of grants and fellowships, and an increase in allowance for cancer chemotherapy contracts.

Recommendation:

The appropriation for direct operations should be increased $11.4 million above the appropriation level for fiscal year 1960 to a total of $107 million.

2. *Planning and Construction Funds.*

(a) Funds should be appropriated in fiscal year 1961 for construction as follows:

Alterations to animal quarters, building 14, for cage washing facilities, and washing equipment	$1, 150, 000
Addition to the Clinical Center cafeteria	300, 000
Initial construction on animal farm, road improvements, fencing, etc	250, 000
Research and animal facilities, Lexington, Ky	350, 000
Total	2, 050, 000

(b) Funds needed in fiscal year 1961 for planning of future construction:

Physical biology building (estimated cost, $8 million)	$500,000
Additional office building (estimated cost, $10 million)	700,000
Intramural research building for the National Institute of Neurological Diseases and Blindness and the National Institute of Mental Health (estimated cost, $7 million)	200,000
Buildings for animal farm (total expenditures estimated at $8 million over a 10-year period)	300,000
Master utility systems at the National Institutes of Health to accommodate new buildings to be constructed	610,000
Total	2,310,000

Recommendation:

Appropriations of approximately $4,400,000 for planning and construction should be made for fiscal year 1961.

B. EXTRAMURAL PROGRAM

1. *Research grants*

(a) *Appropriation for fiscal year 1960.* The appropriation for research grants for the National Institutes of Health in fiscal year 1960 was $202,948,000 which included $2 million for primate centers and $3 million for clinical research units. Of this amount $4.5 was withheld as a part of the unprogramed reserve. It now appears that there will be approved applications in the amount of approximately $3 million which cannot be paid out of the funds available for research grants.

In addition, applications were received in the amount of $11 million for primate centers and $8.5 million for clinical research units against the $2 million and $3 million available for these two programs.

(b) *Projection for fiscal year 1961.* An analysis of figures relative to the National Institutes of Health research project awards made over the past 6 years has shown that the continuation grants have constituted an average of 85 percent of the appropriation of the previous year and that supplements to grants have amounted to an additional 5 to 7 percent. A rough calculation of the minimum budgetary requirement for research grants in fiscal year 1961 can be made on this basis.

The research grant appropriation for fiscal year 1960 was $202,948,000. A fair estimate of the cost of continuation grants would be 85 percent of that amount, or $172,500,000. The size of supplemental requests is increasing with the rising costs of research so it seems appropriate to estimate the probable cost of supplements at 7 percent of the appropriation for fiscal year 1960, or a total of $14,200,000. A minimum cost for supporting the continuation of the present grants program would therefore be approximately $186,700,000.

The number of new applications received has increased markedly—from 1,823 in fiscal year 1956 to 5,932 in fiscal year 1960.

The new applications submitted in fiscal year 1960 (5,932 for $129,612,000) exceeded those submitted in fiscal year 1959 (4,856 for $91,598,000) by 22 percent in number and 42 percent in amount.

Assuming a similar increase in new projects for fiscal year 1961 over fiscal year 1960, the new applications in fiscal year 1961 can be expected to reach a dollar total of $184,049,000. If the approval rate continues at a level of about 48 percent, as has obtained over the past 2 years (table 12, p. 28), new research grant applications recommended for approval can be expected to total approximately $88,300,000.

On the basis of these considerations, the Committee believes that a projection of the following order of magnitude for research grants in fiscal year 1961 might be justified:

Estimated continuation grants: 85 percent of fiscal year 1960 appropriation for research grants	$172, 500, 000
Estimated supplemental grants: 7 percent of fiscal year 1960 appropriation for research grants	14, 200, 000
Cost of continuing program	186, 700, 000
New approvals, estimated as 48 percent of the new applications anticipated	88, 300, 000
Projection for research grants in fiscal year 1961	275, 000, 000

The estimated approved research grant applications which will not be paid from fiscal year 1960 funds is expected to be about $3 million which is a little less than the amount of the unprogramed reserve set aside from the research grant appropriation and held by the Bureau of the Budget, and it has, therefore, not been included in this calculation.

(c) *Payment of additional costs incident to the research supported.* If the allowance for payment of research costs on National Institutes of Health research grants is increased, as recommended by this Committee, either by application of the type of cost analysis formula proposed in the Bureau of the Budget circular No. A–21 or by a flat allowance of 25 percent of total direct costs, the additional charge will have to be included in the appropriation for research grants. If one applies a 10 percent increase, as of July 1, 1960, in the costs of research to the $275 million figure calculated above, this would add $23.9 million, and the total for research grants alone would then be $298.9 million. This represents an increase of $97 million, or 48 percent over the appropriation for fiscal year 1960.

Cost of continuation and development of present program	$275, 000, 000
Additional 10 percent allowance for costs of research	23, 900, 000
Projection for fiscal year 1961 for research grants	298, 900, 000

This sum, however, fails to take into account the fact that, as a result of inflation and the greater cost of new kinds of equipment, the average size of new requests is continuing to increase. The average new application in fiscal year 1956 was $13,967, whereas in fiscal year 1960, just 4 years later, it was $21,850, an

increase of over 56 percent, or an average of 14 percent per year. The size of supplements is also increasing though not quite as rapidly.

In the opinion of the Committee, therefore, the figure of approximately $300 million for the National Institutes of Health research grants alone in fiscal year 1961, represents a conservative estimate of budgetary need. This may well prove inadequate if the percentage increase in dollar value of new research applications is greater in 1961 than in 1960 and if the costs of research continue to rise, as they are very likely to do.

Recommendation:

The appropriation for research grants for fiscal year 1961 should be increased to a level which will (*a*) support the continuation projects; (*b*) meet the anticipated increment in approved new applications in fiscal year 1961; (*c*) take care of the approved research grant applications not paid because of lack of funds in fiscal year 1960; (*d*) pay the full additional costs incident to the research program supported, which would represent approximately a 10-percent increase over the present research cost allowance; and (*e*) meet the increased costs of research resulting from inflation. The sum of at least $300 million is recommended.

2. *Training Grant Program*

In connection with the training grant program discussed on page 69, the Committee would like to emphasize that it takes several years to build up a training program to its full strength and level of effectiveness. Many of the current training programs are in their period of rapid growth and new grants are being started. As mentioned earlier in this report, the fiscal year 1960 level of appropriation for training grants is expected to be more than $14 million short for the payment of approved requests received this year, and would be seriously inadequate in fiscal year 1961 to support the good opportunities for training which are now developing. The Committee believes that a realistic estimate of the total appropriation which could be wisely used for training grants would be that indicated below.

Recommendation:

The appropriation for training grants should be increased by approximately $57 million over the level for fiscal year 1960 to a total of $132 million. This would include (*a*) $14 million for training grants which will be approved but unpaid in fiscal year 1960, (*b*) $22,700,000 to complete the adjustment of all continuation training grants to a forward notification basis, and (*c*) approximately $20 million for expansion of the training grant program, including support of research-oriented medical students through undergraduate training and fellowship programs.

3. *Fellowship Program*

The Committee is unanimous in its belief that an increase in the support of both fellowship and training programs will be essential for the development of the teachers to staff the medical schools of the future, and for the training of research investigators for the expansion of our national program of medical research.

In order to support the fellowship program mentioned on page 70, an increase in appropriations over that for fiscal year 1960 will be required.

Recommendation:

The appropriation for fellowships in fiscal year 1961 should be increased by approximately $7.9 million over that for fiscal year 1960 to a total of $22.5 million in order to (*a*) award the fellowships approved but unpaid in fiscal year 1960 which will amount to approximately $5.4 million, (*b*) award new fellowships from a list of applicants expected to exceed considerably the number received last year, (*c*) expand the senior fellowship program to include the field of clinical research, (*d*) develop special fellowships in preparation for careers in academic medicine, (*e*) increase the number of part-time fellowships to give encouragement and support to research-oriented medical students, and (*f*) increase the number of foreign fellowships.

4. *State Control Programs and Community Demonstration Projects*

Recommendation:

The appropriation for State control programs and community demonstration projects should be raised from $11,875,000 to approximately $15 million, an increase of $3,125,000.

C. HEALTH RESEARCH FACILITIES CONSTRUCTION

The Committee believes that health research facilities construction is one of the most urgent needs in the further expansion of our national program in support of medical research, and that the modifications of the Health Research Facilities Construction Act outlined on page 72 should be undertaken promptly.

Recommendation:

If the modifications in the Health Research Facilities Construction Act recommended by this Committee are approved, the authorization for appropriation of funds for health research facilities construction should be increased to a minimum of $50 million per year, with possible future increases in appropriations to be based on the results of annual reappraisal.

Chapter XI

NEW AREAS OF EMPHASIS FOR THE NATIONAL INSTITUTES OF HEALTH PROGRAM

In addition to the anticipated orderly growth of the current program projected on the preceding pages, there are new areas and programs which the Committee believes should receive special attention. Three of these—clinical research centers, primate centers, and international medical research—received some measure of support in fiscal year 1960. Others have received scattered attention in the programs of the various institutes, but these efforts should be amplified and given better coordination in the year ahead. A discussion of these new areas and rough estimates of the funds required for their support are given below.

A. GENERAL AND CATEGORICAL CLINICAL RESEARCH CENTERS

The concept of specialized centers for clinical research has developed rapidly since it was presented to the Congress last year and has been received with great enthusiasm by the medical schools, universities, and research institutes of the country.

A clinical research center, either categorical or noncategorical in orientation, will provide a stable organizational framework in which investigators from all disciplines necessary for a comprehensive attack on disease problems can enter into most effective collaboration, with all necessary diagnostic and research equipment and resources immediately available, and with bed support for the patients while under study. Such a center will permit the most comprehensive, effective, and professionalized research effort possible. The stimulating intellectual environment which will be provided in such a setting will create opportunities for cross-fertilization and germination of ideas which should contribute enormously to our progress in the prevention, diagnosis, and treatment of disease. Application of research findings will be greatly accelerated.

Diversity and flexibility should be prime characteristics of these research centers. Depending on the particular needs of the parent institution, a center may be organized for general clinical research providing the opportunity for intensive investigation of a number of diseases, with facilities for metabolic studies when needed, or it may be devoted to research on a specific disease or organ. In either case, the result will be a pooling of the efforts of doctors and scientists representing the many clinical and preclinical disciplines to be found in a research-oriented hospital and medical school. The centers will for the most part utilize professional manpower already available in medical institutions,

but use it more effectively, and will therefore not divert physicians from teaching or practice. They will in general be established by rearrangement and reorganization of existing space, but new construction on a nonmatching basis may occasionally be necessary.

These centers will be expensive to maintain but will in the long run, through more efficient organization of manpower and facilities, permit remarkable economy of time and funds in relation to the productivity of research.

It would appear that a great need has existed for such clinical centers which was not brought clearly into focus until the current year. Within 3 months after the announcement by the National Institutes of Health to the medical schools of the country that $3 million was available to make a start on this program, 19 applications were received in the amount of $8.5 million.

The Committee is convinced that this program will expand rapidly, but the concept is so new that no one can be certain of the level of support required in the next fiscal year. The experience so far in 1960 has demonstrated that the effective planning of a clinical research center requires a number of months. With the solution of many practical administrative and policy problems during the current year, it is probable that the development of additional centers will proceed more expeditiously in the future, and the Committee estimates that funds in the amount of $55 million could be spent effectively for the establishment of general and categorical clinical research centers in fiscal year 1961. These funds should be appropriated on a 2-year basis so that if most of 1961 is required for planning or if unanticipated delays are encountered, funds unobligated from this appropriation will be available for fiscal year 1962. In the spring of 1961 a careful appraisal should be made of the progress in this program and the needs which have become apparent. In all probability the program will gather momentum and substantially larger amounts should be anticipated for the financing of centers in fiscal year 1962 and thereafter.

The general and categorical clinical research centers could be supported through the existing grants program with special financial provision, or they could be handled by the contract mechanism. Confidence is expressed in the ability of the National Institutes of Health to develop the mechanisms required to meet the demands of this new opportunity. In the interest of the most effective use of funds, appropriate authority should be given to the administration of the National Institutes of Health to transfer funds from the categorical centers to the general clinical centers when the need for the latter exceeds the need in the categorical areas, as evidenced by approved applications.

It is the opinion of the Committee that implementation of the center concept will represent a truly great advance toward the health goals of our people.

Recommendation:

ESTABLISHMENT OF GENERAL AND CATEGORICAL CLINICAL RESEARCH CENTERS

Funds for general and categorical clinical research centers should be provided in the approximate amount of $55 million on a 2-year basis in fiscal year 1961, with sums for future years to be determined next spring after greater experience with the number and variety of applications for such facilities is available. The amount recommended above represents an increase of $52 million over the $3 million included in the budget under research grants in fiscal year 1960.

B. PRIMATE CENTERS AND OTHER ANIMAL RESOURCES

The great interest shown in the development of primate centers in relation to the $2 million appropriated by Congress last year has been an indication of the need for such facilities by the medical investigators in this country. Twelve requests in the amount of approximately $11 million were received for the $2 million available. It will be possible to support only one of these projects with the funds appropriated for fiscal year 1960. The other eleven have been deferred for reconsideration if additional funds become available in fiscal year 1961. It seems evident that there is a great need for additional primate facilities in the United States, and the establishment of a national primate station should receive serious consideration. The Committee believes that the appropriation for primate centers and a primate station should be substantially increased.

There is, however, an equal or more urgent need for improved animal facilities over the entire country. Much research is actually being delayed or impeded because of the lack of experimental animals of various kinds in a reliable state of nutrition and freedom from disease or with a known genetic background. New facilities should be built and more people trained to staff them.

Recommendation:

PRIMATE CENTERS AND ANIMAL RESOURCES

Funds should be appropriated in the approximate amount of $12 million to support the development of outstanding facilities for the production of laboratory animals, for primate research centers, and for the development of a primate station. This represents an increase of $10 million over the $2 million included for this purpose under research grants in the budget for fiscal year 1960.

C. SUPPORT OF MEDICAL LIBRARIES IN RELATION TO RESEARCH

One urgent need almost all medical schools have in common is the improvement of their libraries which are essential to the functions of education, research, and good medical care. The school administrators have not considered it possible to spare sufficient general operating funds for this purpose, and support by private gifts has been meager. Not only do library facilities need to be modernized, and books and periodicals purchased to a more comprehensive level, but completely new libraries will have to be established for the additional medical schools to be built.

Recommendation:

(1) MODERNIZATION AND SUPPLEMENTATION OF MEDICAL LIBRARIES

Funds should be appropriated in fiscal year 1961 in the amount of $5 million to support the modernization and supplementation of medical libraries.

(2) RENOVATION AND CONSTRUCTION OF LIBRARY FACILITIES

Funds for renovation and construction of library facilities should be sought through the health research facilities construction program or, if health educational facilities construction is added, through this joint program.

D. COMMUNICATIONS RESEARCH AND TRANSLATION

The general problem of scientific communication is one of the areas in which the National Institutes of Health has failed to exert leadership. The enormous problems of handling the rapidly increasing flow of new information in the literature, of codifying it and making it readily accessible urgently cry out for solution. It is now virtually impossible for any investigator to keep up with all the reports of interest and pertinence to his own work which are appearing in the literature, and many find themselves seriously handicapped, or engaged in unnecessary duplication because of this difficulty and publication delays. New methods of processing, publishing, and distributing information should be under active study in order to develop ways and means of presenting such material to medical teachers, research investigators, and practicing physicians in the most effective manner possible. Consideration should be given to the greatest possible application of digital computers and other electronic equipment, of photographic methods of reproduction, the development of abstract journals and services, noncommercial medical newspapers, and the use of radio, television, and other methods of communication. New methods and facilities for translation of foreign literature should also be supported.

Recommendations:

(1) SUPPORT OF COMMUNICATIONS RESEARCH

Funds should be appropriated in the approximate amount of $4.5 million to support a greatly increased research effort on methods of data processing, literature analysis, and information retrieval in both the intramural and extramural programs of the National Institutes of Health in close collaboration with the National Library of Medicine.

(2) DISSEMINATION OF FINDINGS OF MEDICAL RESEARCH

The National Institutes of Health should also undertake a thorough study of ways and means to bring to the attention of both research and practicing physicians new medical knowledge and techniques, presented in the most objective form possible and on the basis of the best informed opinion available.

E. INSTRUMENTATION RESEARCH

The remarkable developments in the physical sciences over the past 15 years have provided new tools and techniques permitting tremendous precision and speed of measurement, and new methods of analysis and processing of data which have only begun to be applied to medical research. There is a wide gap between these two areas of science which must be bridged by greater knowledge and understanding and the development of a common language for professional workers in both fields. The practical applications to medicine of new methods and equipment, including electronic and atomic techniques, digital computers, etc., provide challenging possibilities with great promise in measurement, record taking and processing, analysis, and diagnosis. Delay in implementing these possibilities has to a large extent been due to the fact that many of the new facilities and items of equipment involved are large, complex, costly, require specially trained personnel to operate, and are generally impractical for development in relation to any individual research project. Such facilities should be developed on a geographic basis in relation to large medical research centers and should be available to investigators working in various fields.

Recommendation:

SUPPORT OF INSTRUMENTATION RESEARCH

Funds should be appropriated in the approximate amount of $5 million to initiate the establishment of centers on a regional basis in which the new developments in the physical sciences permitting increased speed, accuracy, and complexity of measurement can be applied to medicine.

F. OPPORTUNITIES FOR STABLE ACADEMIC CAREERS

The training grant and fellowship programs of the National Institutes of Health, the National Science Foundation, private foundations and voluntary health agencies have greatly increased our pool of trained manpower for medical research. One great deficit at present is the lack of enough stable career opportunities at satisfactory salary levels in academic medicine to hold young men beyond the period covered by training grants and fellowships. This Committee believes that at present too many men with great research ability become discouraged by the financial insecurity of low level faculty positions without tenure and leave academic medicine and research to go into practice.

Recommendation:

GRANTS TO SCHOOLS TO INCREASE OPPORTUNITIES FOR STABLE ACADEMIC CAREERS

Funds should be provided through the National Institutes of Health in fiscal year 1961 to support the establishment of 200 research professorships in medical and dental schools and the basic science departments of colleges and universities at a salary level of $20,000 a year, the funds to be made available to, and administered by, the respective institutions.

G. INTERNATIONAL MEDICAL RESEARCH

The dread diseases know no geographic boundaries and the research on these great problems should therefore be truly international. The contribution which talented scientists abroad can make in this field has been severely limited in many cases by lack of funds. The Committee believes that the efforts of these foreign investigators should be enlisted in the fight on major disease problems to the greatest extent possible.

The present support of research grants to investigators in foreign countries is carried out through the categorical institutes and the Division of General Medical Sciences. Approximately $3 million will be expended for such projects in fiscal year 1960. For most of these, the principal criterion governing award has been that the research proposed, because of factors of geography, population, disease incidence, disease vectors, etc., could not be carried out as satisfactorily within the United States. However, many foreign investigators have important creative ideas and talent to contribute to the attack on major disease, and less restricted support is important if their help is to be obtained. The Committee recommends an increase in total level of support of foreign research grants through the categorical institutes to $10 million, an increase of $7 million over the level for fiscal year 1960. These funds should be awarded by the National Institutes of Health after critical scientific evaluation by study

sections and councils and after subsequent special review by an administrative unit for the international medical activities of the National Institutes of Health, such as that proposed on pages 61–62. The National Institutes of Health should supplement the support given outstanding foreign investigators by their native countries when this is inadequate, and when United States funds can be given without disturbing the structure of support of scientific research in the foreign countries involved. In this effort close collaboration should be fostered with such international organizations as the World Health Organization and the Pan American Sanitary Bureau.

The exchange of information and opinions on medical research between scientists of different countries is one of the firmest bases on which to build bridges of international cooperation and understanding. This has so far offered the best hope in our relationships with countries behind the Iron Curtain, as the success of the cultural exchange missions in the medical field has shown. The Committee believes that these exchanges should continue and be extended under the auspices of the Public Health Service.

In addition, they believe that the National Institutes of Health has a responsibility to exert forceful leadership in promoting the exchange of medical research information and in affording opportunities for medical scientists of different countries to meet together under suitable circumstances on subjects of international interest and concern.

In spite of the extensive participation of the United States in international medical affairs and the desirability and probability that this involvement will increase, there is no place in the United States available for the efficient conduct of medical meetings, symposia, and working seminars attended by nationals of different countries. While the National Institutes of Health is a medical research center which attracts hundreds of people from foreign countries every year, it has no facilities equipped for simultaneous translation and suitable conduct of this important aspect of medical research. As a consequence, full advantage cannot be taken of the knowledge of many experts who lack the ability to present lectures and participate in give-and-take discussions in the English language. An international medical research facility, equipped for simultaneous translation of conferences, with rooms of different sizes for various working groups, lounges for informal discussion, a cafeteria, and dormitory-type bedrooms for visiting scientists would not only serve an urgent operating need, but would also be a symbol of the participation and leadership of this country in international medical affairs.

Recommendations:

(1) SUPPORT OF INTERNATIONAL MEDICAL RESEARCH

Research in foreign countries as a resource in the attack on the dread diseases should be supported by the National Institutes of Health after scientific evaluation through the accepted mechanisms of review, with subsequent special consideration by a group with broad knowledge of the structure of support of medical research abroad. The amount of such support should be raised to a level of approximately $10 million in fiscal year 1961 and should be increased in subsequent years as the administrative structure can be developed to handle the special problems involved.

(2) DEVELOPMENT OF INTERNATIONAL MEDICAL CONFERENCE CENTER AT THE NATIONAL INSTITUTES OF HEALTH

Careful consideration should be given to the planning of an international medical conference building on the National Institutes of Health campus which would serve as a center for international medical activities. This facility should provide for a large auditorium and smaller meeting rooms with simultaneous translation facilities, lounges, dining facilities, and dormitory-type bedrooms for visiting scientists. The building could also include offices for those directly concerned with the administration of international medical research affairs of the National Institutes of Health.

H. HEALTH EDUCATIONAL FACILITIES CONSTRUCTION

The compelling need for the renovation and expansion of the facilities of existing medical and dental schools and for the construction of new ones, as recommended in the Bane report, cannot be denied. It is apparent that neither the States nor private philanthropy can finance all of the medical and dental school construction required, and it is therefore imperative that the Federal Government take partial responsibility for the construction of the additional facilities which are absolutely essential for the training of physicians and dentists for the future.

Legislation has already been introduced in Congress which would amend the Health Research Facilities Construction Act to include health educational facilities construction and which would authorize to be appropriated:

(1) $50 million per year for each of 5 years for the expansion and improvement of existing schools;

(2) $100 million over a 10-year period for the construction of new schools; and

(3) Grants not to exceed $25,000 for preparing initial plans and estimates.

The grants for health educational facilities construction under this measure would be administered by the National Advisory Council on Health Research Facilities.

The Committee has heard testimony to the effect that many of the existing schools are urgently in need of both renovation and new construction. Many seem to have exhausted their sources of matching funds in order to build new health research buildings and are very doubtful that they can raise additional sums for health educational facilities to the extent required in the proposed bill. The Committee believes that the need for health educational facilities in which to train the physicians needed for our expanding population is so great that adherence to a rigid matching formula would be unwise and is pleased that this has been recognized in the pending legislation by permitting the Federal share to rise to 66⅔ percent of the total for that part of the construction attributable to expanded capacity for freshman enrollment.

The Committee believes, however, that the Congress is interested in quality as well as quantity of physicians. It understands the point of view in some schools which think that they should not, or cannot, expand enrollment and yet urgently require funds for renovation and new construction in order to give the best possible modern medical education to their students, interns, and residents. It is much more difficult to raise funds for renovation of old buildings than for new construction, and the Committee believes therefore that for such construction, also, a graduated matching formula should be used, even if freshman enrollment will not be increased thereby. Consideration should also be given to federally guaranteed long-term, low-interest loans for school construction.

Recommendation:

AMENDMENT OF THE HEALTH RESEARCH FACILITIES CONSTRUCTION ACT TO INCLUDE HEALTH EDUCATIONAL FACILITIES

The Health Research Facilities Construction Act should be amended to include health educational facilities construction with the appropriation of additional funds recommended in pending legislation as follows:

(1) $50 million per year for 5 years to cover expansion and improvement of existing schools;

(2) $100 million to be allocated over a 10-year period for the construction of new schools, with the limit of Federal participation raised to 66⅔ percent of the cost; and

(3) Grants not to exceed $25,000 for preparing initial plans and estimates.

An appropriation of $60 million for fiscal year 1961 is recommended to initiate a program for the construction of health educational facilities.

Chapter XII

SUMMARY OF PROJECTIONS FOR THE FISCAL YEAR 1961 BUDGET OF THE NATIONAL INSTITUTES OF HEALTH

The Committee has reviewed the present needs and future prospects of the National Institutes of Health and the great contribution its programs are making to the health of the American people. A summary of its conclusions as to the general magnitude of budgetary needs in fiscal year 1961 is presented in the following tables. This includes the amount required for the continuation and orderly growth of the present program, and for the development of new areas of emphasis which the Committee believes should be more generously supported in the future.

TABLE 25.—*Projection: Continuation and development of the National Institutes of Health program*

[In thousands of dollars]

	Fiscal year 1960	Recommended for fiscal year 1961	Increase
Direct operations (intramural)	95, 570	107, 000	11, 430
Grants (extramural):			
1. Research grants	[1] 202, 948	[2] 300, 000	97, 052
2. Research fellowships	14, 570	22, 500	7, 930
3. Training grants	75, 037	132, 000	56, 963
4. State control and community demonstration program	11, 875	15, 000	3, 125
Total, grants	304, 430	469, 500	165, 070
Total for continuation and development of present program	400, 000	576, 500	176, 500
Intramural construction and planning	300	4, 400	4, 100
Health research facilities construction	30, 000	50, 000	20, 000

[1] This amount includes: $3 million for clinical research units; $2 million for primate centers; and $3 million for international medical research.

[2] This amount includes continuation of the three items listed under footnote (1) at approximately the fiscal year 1960 level.

The Committee believes that the amounts listed below are fair estimates of the funds that could be wisely used in fiscal year 1961 for the new areas of emphasis which have been recommended.

TABLE 26.—*Projection: New areas of emphasis for the National Institutes of Health program*

[In thousands of dollars]

	Fiscal year 1960	Recommended for fiscal year 1961	Increase
General and categorical clinical research centers	[1] (3, 000)	[2] 55, 000	52, 000
Primate centers and other animal resources	[1] (2, 000)	[2] 12, 000	10, 000
Support of medical libraries in relation to research	----------	5, 000	5, 000
Communications research and translation	----------	4, 500	4, 500
Instrumentation research	----------	5, 000	5, 000
Additional opportunities for stable academic careers	----------	4, 000	4, 000
International medical research	[1] (3, 000)	[2] 10, 000	7, 000
Total	----------	95, 500	87, 500
Health educational facilities construction	----------	[3] 60, 000	60, 000

[1] This amount is included under research grants in table 25 as part of the fiscal year 1960 program.

[2] The equivalent of the 1960 level for these activities is included in the fiscal year 1961 projection of the present program in table 25.

[3] This should be appropriated under an amendment to the Health Research Facilities Construction Act.

SUMMARY OF PROJECTIONS FOR FISCAL YEAR 1961 FOR THE NATIONAL INSTITUTES OF HEALTH

The Committee believes that the National Institutes of Health could utilize effectively in fiscal year 1961 the total amounts shown below for the further development of the present program and for the new areas of emphasis proposed.

	Fiscal year 1960	Committee's recommendation for fiscal year 1961	Increase
Continuation and development of present program	$400,000,000	$576,500,000	$176,500,000
Increase for new areas of emphasis	----------	87,500,000	87,500,000
Total	400,000,000	664,000,000	264,000,000

In addition, the Committee would add under separate appropriations:

	Fiscal year 1960	Committee's recommendation for fiscal year 1961	Increase
Intramural planning and construction	$300,000	$4,400,000	$4,100,000
Health research facilities construction	30,000,000	50,000,000	20,000,000
Health educational facilities construction	----------	60,000,000	60,000,000

Recommendations:

A total budget for the National Institutes of Health for fiscal year 1961 of approximately $664 million should be considered a reasonable estimate of the funds which could be wisely and usefully expended through the National Institutes of Health for the attack on major disease problems during the coming year, provided adequate time is allowed for planning and staffing new programs. This represents an increase of $264 million over the budget for fiscal year 1960.

To this should be added under separate appropriations $4.4 million for intramural planning and construction, $50 million for health research facilities construction, and $60 million to initiate a program of health educational facilities construction.

This level of support would assure the effective utilization of the Nation's present potential for medical research and would allow the growth which this Committee believes necessary. The appropriation of less than the amount suggested may mean a consequent postponement of the time when answers to major disease problems could become available.

TABLE 27.—*Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health: Fiscal year 1961 budget estimate of Committee of Consultants on Medical Research*

[In thousands]

Activity	GRS-NIH	NIAMD	NIAID	NINDB	NCI	NIMH	NHI	NIDR	Fiscal year 1961 total	Fiscal year 1960 total
CONTINUATION AND DEVELOPMENT OF PRESENT PROGRAMS										
GRANTS										
Research projects	$40,000	$43,000	$30,500	$37,000	$46,000	$37,000	$59,500	$7,000	[1] $300,000	[1] $202,948
Research fellowships	9,100	800	1,250	700	2,900	2,850	4,000	900	22,500	14,570
Training	30,000	12,700	5,000	10,765	9,200	45,000	16,370	2,965	[2] 132,000	75,037
State control programs					2,425	6,500	3,375		12,300	10,375
Community demonstration projects					2,700				2,700	1,500
Total grants	79,100	56,500	36,750	48,465	63,225	91,350	83,245	10,865	469,500	304,430
DIRECT OPERATIONS										
Research		8,990	7,935	7,495	13,195	8,300	8,360	2,525	56,800	49,885
Biologics standards	2,745								2,745	2,805
Review and approval	1,670	890	580	1,100	1,385	1,675	1,295	280	8,875	7,076
Training activities				60		200	185		445	335
Professional and technical assistance					5,865	2,230	2,300	1,330	11,725	10,786
Chemotherapy contracts					23,140				23,140	22,142
Dental resources								1,080	1,080	772
Administration		200	189	260	520	655	246	120	2,190	1,769
Total direct operations	4,415	10,080	8,704	8,915	44,105	13,060	12,386	5,335	107,000	95,570
Total continuation and development of present programs	83,515	66,580	45,454	57,380	107,330	104,410	95,631	16,200	576,500	400,000

DEVELOPMENT OF NEW AREAS OF EMPHASIS										
Additional general and categorical clinical research centers	17,000	1,000	500	1,500	15,000	2,000	15,000	----	[3] 52,000	[5] 3,000
Additional primate centers and other animal resources (increase)	----	----	----	----	----	----	10,000	----	[4] 10,000	[5] 2,000
Support of medical libraries in relation to research	650	700	550	600	800	600	1,000	100	5,000	----
Communications research and translation	630	540	360	450	855	810	765	90	4,500	----
Instrumentation research	700	600	400	500	950	900	850	100	5,000	----
Additional opportunities for stable academic careers	1,000	360	200	280	320	1,240	520	80	4,000	----
International medical research, increase	910	980	770	840	1,120	840	1,400	140	7,000	----
Total increase for development of new areas of emphasis	20,890	4,180	2,780	4,170	19,045	6,390	29,535	510	87,500	----
Total estimate for the National Institutes of Health	104,405	70,760	48,234	61,550	126,375	110,800	125,166	16,710	664,000	----
OTHER PUBLIC HEALTH SERVICE APPROPRIATIONS										
Intramural planning and construction	----	----	----	----	----	----	----	----	4,400	300

See footnotes at end of table, p. 106.

TABLE 27.—*Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health: Fiscal year 1961 budget estimate of Committee of Consultants on Medical Research*—Continued

[In thousands

Activity	GRS-NIH	NIAMD	NIAID	NINDB	NCI	NIMH	NHI	NIDR	Fiscal year 1961 total	Fiscal year 1960 total
OTHER PUBLIC HEALTH SERVICE APPROPRIATIONS—Continued										
Health research facilities construction									$50, 000	$30, 000
Health educational facilities construction									60, 000	

[1] Includes: (1) Clinical research units (therapeutic and metabolic), $3,000,000; (2) primate centers, $2,000,000; and international medical research, $3,000,000.

[2] Includes adjustment of $22,739,236 for forward notification.

[3] Excludes $3,000,000 for clinical research units (metabolic and therapeutic) included in 1 above.

[4] Excludes $2,000,000 for primate centers included in 1 above.

[5] Included in the amount of $202,948,000, above, for research projects.

Chapter XIII

CONCLUSIONS AND RECOMMENDATIONS OF THE COMMITTEE OF CONSULTANTS ON MEDICAL RESEARCH

I. Adequacy of Federal Support of Medical Research

The funds appropriated by the Congress for the support of medical research, although substantial, are still not sufficient to assure the full utilization of the Nation's potential for an attack on the dread diseases, and the present level of support is far from adequate to permit the great advances essential for the future (p. 5).

Recommendation:

Role of Federal Government in Support of Medical Research. The Federal Government should supplement private, industrial, and State funds, as may be necessary, to support medical research on the scale required to carry out a determined attack on major health problems. The magnitude of Federal support should be neither limited by, nor paced by, the rate of increase of non-Federal sources of support (p. 6).

II. Effectiveness of Utilization of Federal Funds Appropriated for Medical Research

Considering the program as a whole, the funds appropriated by the Congress for the support of research on major disease problems have been efficiently spent in the best interests of the research for which they were designated (p. 9).

Recommendation:

(1) *New Administrative Patterns for Support of Research.* For the effective allocation of the larger funds which will be required in the future, new administrative patterns for the support of research must be employed. These will include institutional grants, program grants, and large grants to clinical research and special resource centers.

(2) *Method of Appropriation for New Programs.* In order to assure the highest efficiency of utilization of funds for new programs and those requiring a long lead time for effective planning, Congress should give serious consideration to granting funds on a 2-year basis (or more) when making appropriations for such purposes (p. 9).

III. Impact of the Expanding Federal Program in Support of Medical Research

A. EFFECT ON MEDICAL SCHOOLS

Recommendations:

Construction of Health Educational Facilities. The Federal Government should supplement the efforts of the States and of private sources to meet the construction needs of our public and nonprofit medical, dental, and public health schools by appropriating funds on a matching basis for:

(a) Improvement and/or expansion of existing schools of medicine, dentistry, and public health;

(b) New 2-year schools of basic medical sciences;

(c) New 4-year schools; and

(d) The necessary teaching hospitals (p. 15).

Payment of Full Costs of Research. The National Institutes of Health should be authorized to allow a realistic amount for the costs of research directly related to the program supported. This could be provided in either of the following ways, listed in order of preference:

(1) Full costs as determined by a cost analysis formula (such as that proposed in the Bureau of the Budget Circular No. A–21), or

(2) Twenty-five percent of total direct costs except for those institutions which have formally established lower rates on the basis of audit by a Federal agency (the average figure for medical schools audited under the "Blue Book Formula," reported to the National Science Foundation in its 1957–58 survey was 25.1 percent) (p. 18).

Institutional Grants. The Public Health Service should be permitted by law to make institutional grants, upon recommendation of the appropriate council of the National Institutes of Health, to public or nonprofit universities, hospitals, laboratories, research institutes, and other institutions, for the general support of their medical research and research training programs.

The proposed limit on such grants to 15 percent of the total research grant appropriation should be removed, and the relation of institutional grants to the total research grant program should be administratively determined. The current highly effective project grants should continue as a major method for the support of research (p. 20).

B. EFFECT ON MEDICAL PRACTICE

The contribution of medical research to medical practice in terms of new knowledge, techniques, and methods of patient care has been a prime factor in the increase in effectiveness of the individual physician and in raising the standard of medical care to the highest level ever achieved. This gain has outweighed the developing quantitative shortage of medical manpower (p. 24).

C. EFFECT OF NON-FEDERAL SOURCES OF SUPPORT

The expansion of the Federal program in support of medical research has served as a stimulus, rather than as a deterrent, to non-Federal sources of support (p. 27).

D. EFFECT ON QUALITY OF REVIEW

The increasing annual appropriations for the National Institutes of Health in recent years have been administered with maintenance of the same high standard of review which has been characteristic of that program since its inception. Furthermore, the Committee is convinced that the quality of the research supported has improved (p. 29).

IV. Status of Medical Manpower

A. NUMBER OF PHYSICIANS

Recommendation:

Training of Additional Physicians and Dentists. Measures should be initiated promptly to train greater numbers of physicians and dentists by implementing the recommendations of the Bane committee report (p. 33).

B. RECRUITMENT OF MEDICAL STUDENTS

Recommendations:

(1) *Financial Aid to Medical Students.* The Federal Government should supplement private, industrial, and State sources in providing scholarship, fellowship, and loan assistance to medical and dental students interested in careers of teaching and research, as it now does to Ph. D. candidates in the basic sciences.

(2) *Information on Careers in the Medical Sciences.* Greater effort should be made through the schools and the various media of communication to inform more young people of the opportunities for service and the challenge, satisfactions, and rewards of careers in medicine, dentistry, and public health (p. 36).

C. MANPOWER FOR RESEARCH

The need for more physicians and dentists should not be considered a limitation on the continued expansion of the health research effort of the country at this time. Ph. D. graduates and candidates, now making up approximately one-half of the total professional personnel engaged in health research, together with the support of personnel in the paramedical specialties, technicians and others, assure an adequate manpower base for the continued growth of medical research. Moreover, the use of new instrumentation, techniques, and organizational structures for research can greatly magnify the productivity of the manpower available (p. 38).

V. Government Agencies Other Than the Department of Health, Education, and Welfare

Recommendation:

Diversity of Federal Support for Medical Research. Other Federal agencies besides the National Institutes of Health should continue to maintain strong programs in support of medical research. These programs should not only serve the specific health missions of these agencies and make their operations more effective, but should also utilize their special opportunities to make contributions of particular value to the total medical research effort of the country. The agencies should be given the funds to support both basic and applied research and to sustain both in-service programs and strong extramural programs in support of medical research in non-Federal, nonprofit research institutions (p. 40).

A. Department of Defense

(1) The maintenance of a strong medical research program, both extramural and intramural, and including basic as well as applied research, is essential to the armed services for the achievement of the following goals:

(a) The acquisition of knowledge necessary for the specific missions of the three armed services;

(b) The maintenance of the highest standards of patient care for military personnel and their dependents in hospitals of the armed services;

(c) The advancement of medical knowledge through the utilization of the opportunities for good research observations under well-controlled conditions with unusual opportunities for followup which the hospitals of the armed services can afford. This is especially important in military hospitals in foreign countries where less familiar disease conditions may occur.

(2) The support of medical research through the Department of Defense has not been sufficient to fulfill adequately the purposes for which this support was given. The armed services represent an important resource for medical research which, primarily because of lack of funds and personnel, is being poorly utilized at the present time (p. 46).

Recommendations:

(1) *Increase in Appropriation for Medical Research by the Army, Navy, and Air Force.* As recommended by the Advisory Panel on Medical Sciences to the Secretary of Defense 3 years ago, the appropriation for medical research in the armed services should be approximately doubled in order to permit the full utilization of the excellent facilities and opportunities for research available in military research institutes and hospitals.

(2) *Increase in Number of Civil Service Positions for the Department of Defense.* The three armed services should be authorized and provided with funds to employ in military hospitals and research institutes a larger number

of civilian scientists and the necessary supporting personnel under civil service, including additional Public Law 313 positions.

(3) *Increased Stability and Level of Support for Extramural Programs of Armed Services.* Sustained and expanded appropriations should be provided for more stable support of the extramural medical research programs of the armed services.

(4) *Use of Bio-Sciences Information Exchange.* The Committee urges all three armed services to give full cooperation to, and utilize the services of, the Bio-Sciences Information Exchange in providing and obtaining information on the support of research, and recommends that they register all research applications when received, as the National Institutes of Health, the Atomic Energy Commission, and the National Science Foundation have done so effectively (p. 47).

B. VETERANS' ADMINISTRATION

The present level of support of medical research in hospitals of the Veterans' Administration is inadequate to permit the full contribution that agency can make to research on the dread diseases (p. 49).

Recommendation:

Increased Appropriation for Veterans' Administration. The appropriation for the Veterans' Administration program of medical research should be substantially increased for 1961 (p. 49).

VI. Department of Health, Education, and Welfare, Public Health Service

Recommendations:

Changes in Organization of Public Health Service. In the present study of the reorganization of the Public Health Service, urgent consideration should be given to:

(a) Effective centralization and coordination of the Federal programs of research on environmental health;

(b) Coordination of activities in progress in the various divisions of the Public Health Service pertaining to research on problems of aging and medical care of the aged; and

(c) Strengthening programs of demonstration and application of new research findings (p. 53).

VII. National Institutes of Health

The research grant, training grant, and fellowship programs of the National Institutes of Health over the past 15 years have constituted the most important single force in raising the standard of medical research, teaching, and practice in the United States to its present high level. It is of paramount importance that these programs receive support in proportion to the rate of growth anticipated (p. 61).

A. ORGANIZATION AND ADMINISTRATION

Recommendations:

Institute Status for Division of General Medical Sciences. The Division of General Medical Sciences should be raised to institute status by legislation paralleling the statutory authority of the National Heart Institute, with a name such as "The Institute of Experimental Medicine and Biology," and with its own council, thus relieving the National Advisory Health Council of the specific responsibility of advising in this field (p. 61).

Special Administrative Unit for International Activities. A special administrative unit should be established within the National Institutes of Health for the consideration of all problems relating to the international activities of that organization. This unit should also be responsible for the review of foreign research applications after they have been considered on the basis of scientific merit by the study sections and by the councils of the categorical institutes. It should be staffed by individuals with broad knowledge of the structure of support of medical research and education in foreign countries (p. 62).

B. PERSONNEL

Recommendations:

(1) *Increase in Salary Ceiling and Number of Positions for Specially Qualified Personnel.* Section 208(g) of the Public Health Service Act should be amended to increase the salary ceiling for specially qualified scientists and professional personnel, and the number of such positions allotted to the National Institutes of Health should be raised substantially, and increased as needed in the future.

(2) *Assignment of Commissioned Officers to Civil Service Positions.* Section 214 of the Public Health Service Act should be amended to permit assignment of a limited number of commissioned officers to the civil service system in order to encourage competent officers to assume positions of heavy responsibility for which they cannot receive further promotion under the commissioned corps.

(3) *Recruitment of Top-Level Personnel from Outside the Public Health Service.* The National Institutes of Health should be encouraged to recruit its top-ranking personnel from outside the commissioned corps of the Public Health Service, as well as from within, in order to be able to select its leaders from the largest possible pool of outstanding scientists with both research experience and talent for administration (p. 64).

C. SPACE NEEDS AND CONSTRUCTION

Recommendations:

(1) *Additional Office Space.* The urgent need for additional office space should be recognized by authorization and appropriation of the funds for construction of an additional office building at the National Institutes of Health, so that all administrative groups now housed in rental space elsewhere can be

brought into more effective relationship with the other segments of the National Institutes of Health with which they must work in close cooperation.

(2) *Research Building for the National Institute of Neurological Diseases and Blindness and the National Institute of Mental Health.* Funds should be appropriated in the fiscal year 1961 budget for the planning of a new building on the National Institutes of Health campus to serve the intramural research requirements of both the National Institute of Neurological Diseases and Blindness and the National Institute of Mental Health.

(3) *Physical Biology Building.* Authorization should be granted for the construction of a physical biology building which would enable all investigators at the National Institutes of Health to utilize the new techniques of physical biology.

(4) *International Conference Center.* In order to facilitate the exchange of information between scientists of different countries and to support the role of the National Institutes of Health in international medical affairs, authorization should be granted for the planning of an international conference building for the National Institutes of Health.

(5) *Animal farm.* Funds should be appropriated in fiscal year 1961 for initial construction, road improvements, fencing, and for designing and planning of future construction on the animal farm.

(6) *Other Construction, Alterations, and Improvements.* Funds should also be appropriated in fiscal year 1961 for (a) alterations to the animal quarters at the National Institutes of Health for cage washing facilities and equipment; (b) an addition to the clinical center cafeteria; (c) research and animal facilities at Lexington, Ky.; and (d) for planning and designing the expansion of the master utility systems at the National Institutes of Health to accommodate the buildings to be constructed in the future (p. 66).

D. INTRAMURAL RESEARCH PROGRAM

Recommendation:

Intramural Research Program. The further growth of the intramural research programs of the National Institutes of Health should be qualitative rather than quantitative. The recruitment and retention of outstanding personnel are therefore essential. Funds will be needed to keep up with the rising costs of research, to provide major improvements in instrumentation and in communication of research knowledge, and in the future, to operate and staff the additional buildings under construction and those proposed (p. 67).

E. EXTRAMURAL PROGRAM

1. *Research Grants*

Recommendations:

(1) *Additional Study Sections.* Additional study sections should be established and some of the present study sections should be subdivided when necessary in order to distribute the increasing task of project review. Such

subdivisions, however, should not exceed the limit compatible with a comprehensive view of a subject field by the members.

(2) *Increase in Administrative Staff.* The administrative staff should be enlarged to keep pace with the growth in number of grant applications to be reviewed.

(3) *New Administrative Patterns for Support of Research.* In order to assure the effective utilization of the larger funds which will be required in the future, new administrative patterns for support of research must be developed. These should be employed according to the needs of the respective institutions.

(a) *Research Centers: General, Clinical, Categorical, and Special Resource Research Centers.* The development of clinical research centers, both categorical and noncategorical, and of special research centers based on a specific disease, approach, or resource, will unify the efforts of many investigators in a multidisciplined attack upon disease problems and will constitute one of the most important opportunities for increasing the productivity of research.

(b) *Institutional Grants.* The return of the responsibility for allocating research and training funds to the research institutions and medical schools of the country in the form of institutional grants will provide greater freedom to the institutions in building up their research services, in stabilizing their research programs, and in establishing additional stable career opportunities.

(c) *Program Grants.* The consolidation of a number of small grants of an established investigator into a single program grant with long-term support will assure greater stability for the investigator and simplify the requirements of central review (p. 68).

2. *Training Grants*

Recommendations:

(1) *Increase in Appropriation for Training Grants.* The appropriation for training activities supported through the National Institutes of Health should be substantially increased in fiscal year 1961 to help provide the trained manpower for teaching and research so urgently needed for the future.

(2) *Medical Student Research Training Program.* A medical student research training program based on the principles which proved so successful in the experimental training grants should be established as a stimulus to, and an aid in the support of, research-oriented medical students and college science majors.

(3) *Consolidation of Training Programs.* The many different training programs should be consolidated, as much as is practicable, into a smaller number of varities, bringing together under relatively broad guidelines those programs which are very similar in operation and function. The recent localization of responsibility for overall policy and for referral of training grant

applications in a separate unit in the Division of Research Grants should prove to be of help in the effort to reduce the complexity of the training grant programs.

(4) *Adjustment of all Training Grants to Forward Notification Basis.* Funds should be appropriated for fiscal year 1961 in the amount of approximately $23 million to complete the adjustment of both graduate and undergraduate training grants to a forward notification basis, with beginning dates in appropriate relation to the academic year. It should be emphasized that this does not impose any increase in total cost to the Government but merely alters the time of payment (p. 69).

3. *Fellowships*

Recommendations:

(1) *Participation of Institutions in the Selection of National Institutes of Health Fellowships.* A major portion of the responsibility for selection of fellows under the National Institutes of Health fellowship program should be transferred to the institutions in which the candidates have trained where the awards may be made on the basis of thorough knowledge of the qualifications and needs of the individual candidates.

(2) *Extension of Senior Fellowship Program to Clinical Research.* Funds should be appropriated to permit extension of the senior fellowship program to include the field of clinical research.

(3) *Training for Academic Careers.* Special fellowships should be provided at the postdoctoral level to support training for a career in academic medicine.

(4) *Part-time Fellowships.* The appropriation for part-time fellowships should be increased to give encouragement to, and help provide greater support for, research-oriented medical students.

(5) *Increase in Number of Foreign Research Fellowships.* The foreign research fellowship program should be increased to permit a modest expansion in the total number of fellowships, the inclusion of additional countries as training potential becomes evident, and to allow renewal of fellowships for a second year when such extensions are approved by the original nominating committees in the foreign countries and the National Institutes of Health. The growth of this program should be consistent with maintenance of the present high standard of quality of the fellows (p. 70).

5. *Collaborative and Cooperative Studies*

Recommendation:

Collaborative Programs. Support of broad collaborative programs should be continued as an effective research technique, and new ones should be started when a definite need can be demonstrated. The Committee commends the National Institutes of Health policy of subjecting these programs to continual internal review and periodic evaluation by appropriate groups (p. 72).

Recommendations:

(1) *Extension of Authorization of Health Research Facilities Construction Act.* The authorization for the Health Research Facilities Construction Act should be extended for a minimum of 5 years beyond its present expiration date.

(2) *Modification of Matching Requirement in Exceptional Circumstances.* In situations in which there is a clear and urgent justification for the construction of health research facilities for which full matching funds cannot be obtained, consideration should be given to modification of the matching requirement.

(3) *Multipurpose Facilities Construction.* The Health Research Facilities Construction Act should be amended to include multipurpose facilities for research, research training, and health education when the construction is primarily for research and the educational activities are closely related to the research program.

(4) *Health Educational Facilities Construction.* The Committee also endorses pending legislation which would amend the Health Research Facilities Construction Act to authorize a 10-year program of grants for construction of medical, dental, and public health educational facilities (p. 73).

VIII. Budgetary Projections for the National Institutes of Health for Fiscal Year 1961

The Committee's recommendations for appropriations for fiscal year 1961 are summarized in chapter XII, pages 101–106.

The continuation and development of the present program is estimated to require a total of $576,500,000 (table 25, p. 101).

In addition the Committee recommends new or increased appropriations in the amount of $87,500,000 for seven areas which it believes should receive special emphasis in fiscal year 1961, namely: (1) General and Categorical Clinical Research Centers; (2) Primate Centers and Other Animal Resources; (3) Support of Medical Libraries in Relation to Research; (4) Communications Research and Translation; (5) Instrumentation Research; (6) Additional Opportunities for Stable Academic Careers; and (7) International Medical Research (table 26, p. 102).

Under other Public Health Service appropriations the following are recommended: (1) Intramural planning and construction for the National Institutes of Health, $4.4 million; (2) Health Research Facilities Construction, $50 million, and (3) Health Educational Facilities Construction, $60 million, as shown on page 103.

The distribution of the recommended funds according to institutes is presented in table 27, pages 104–106.

Recommendation:

A total budget for the National Institutes of Health for fiscal year 1961 of approximately $664 million should be considered a reasonable estimate of the funds which could be wisely and usefully expended through the National Institutes of Health for the attack on major disease problems during the coming year, provided adequate time is allowed for planning and staffing new programs. This represents an increase of $264 million over the budget for fiscal year 1960.

To this should be added under separate appropriations $4.4 million for intramural planning and construction, $50 million for health research facilities construction, and $60 million to initiate a program of health educational facilities construction.

Appendix I

HISTORY OF THE COMMITTEE OF CONSULTANTS ON MEDICAL RESEARCH

When the Committee on Appropriations of the U.S. Senate considered the appropriations bill submitted by the Subcommittee on the Departments of Labor, and Health, Education, and Welfare for fiscal year 1960, the members expressed concern regarding the size of the increase proposed for the National Institutes of Health over the appropriation of $294,383,000 for the previous year. The sum proposed by the subcommittee was $480,604,000, an increase of $186,325,000 over the President's budget and an increase of $136,325,000 over the House allowance. In the subsequent conference with the House, the appropriation was set at $400 million, an increase of approximately $106 million, or 36 percent, over the previous year.

The Senate Appropriations Committee approved the increase as proposed by the subcommittee on June 23, 1959, and in doing so proposed the following resolution which was passed by unanimous vote:

> *Resolved*, That the subcommittee with funds available to the committee for investigations organize a group of specialists and others to determine whether the funds provided by the Government for research in dread diseases are sufficient and efficiently spent in the best interests of the research for which they are designated, said subcommittee shall take into account the facilities, the experts, the laboratories, the availability of private funds and all other factors including the possible impact which the recruitment of those engaged in research enter into such a study of research efforts. The Subcommittee on Appropriations for the Departments of Labor, and Health, Education, and Welfare shall make its report to the Committee on Appropriations on or before February 1, 1960.

Plans were initiated in August by the Senate Appropriations Subcommittee for the Departments of Labor, and Health, Education, and Welfare, under Senator Lister Hill as chairman, leading to the formation of the Committee of Consultants on Medical Research.

On August 14th the mission of this committee was given added emphasis when the President, in signing the appropriation bill for the Departments of Labor, and Health, Education, and Welfare, issued a statement which embodied some of the same concerns which had been expressed by the Senate committee, and ordered the adoption of certain criteria which would tend to satisfy these concerns.

The President's statement of August 14, 1959 follows:

THE WHITE HOUSE

STATEMENT BY THE PRESIDENT

I have today approved H.R. 6769, which makes appropriations for fiscal 1960 for the Departments of Labor, and Health, Education, and Welfare, and for certain other agencies.

I have taken this action despite concern with regard to the appropriations for the Department of Health, Education, and Welfare.

First, with respect to medical research, every American is of course deeply interested in the improvement of health. This interest is reflected in the administration's progressive record of support for health activities. But there is a limit to the rate at which medical research can grow and yet grow soundly. Appropriations to the National Institutes of Health have increased fourfold in the last 6 years. H.R. 6769 would add a further increase—from $294 million to $400 million—or 36 percent in a single year. This increase gives me cause for concern on three grounds. I am concerned lest it should:

(1) Lower the quality of the projects supported by increasing the flow of grant applications more rapidly than the procedures for their careful appraisal can be effectively adapted;

(2) Cause too great a diversion into research of the manpower and other resources needed for equally vital teaching and medical practice;

(3) Substitute Federal funds for non-Federal support of medical research and training and discourage further expansion of such support.

Such effects would work against the very goal being sought—improved health for all the American people. Indeed, the Congress itself apparently felt concerned about the possible lowering of research quality which might result from the level of funds it approved, since the conference report on H.R. 6769 states that "there should be no reduction in the high standards for determining the acceptability of research projects for financing from these appropriations."

Because the American taxpayer is entitled to have his tax money spent wisely and efficiently, I am directing the Secretary of Health, Education, and Welfare and the Surgeon General of the Public Health Service to take appropriate steps to satisfy themselves that the following criteria will be observed in the review of any new research project or training program:

(1) That it is of such high priority and great promise that its deferment would be likely to delay progress in medical discovery;

(2) That it will not result in the harmful diversion of manpower and other resources needed for teaching and medical care services; and

(3) That it will not bring about the substitution of Federal for non-Federal sources of support for medical research and training.

Second, in the category of construction grant programs—grants for the construction of sewage treatment plants, facilities for medical care and research, and schools in federally affected areas—the appropriations made in the bill would provide for program levels which seem to me to be entirely too high in relation to other essential Government programs.

I do not doubt that worthwhile construction projects can be found in each of these areas which will absorb the funds appropriated. But the mere fact that money is spent for some identifiable need does not mean that it is wisely spent, or that it must be spent by the Federal Government. With respect to the waste treatment construction grant program, I am requesting the Secretary of Health, Education, and Welfare to urge the States, in their various State plans, to make every effort to give first priority in the approval of projects by the States to those which involve interstate stream pollution or affect downstream communities.

A national budget demands hard choices just as does a family budget. The recognition of a need is the beginning, not the end of any budget-making process. I recognize, however, that in reconciling competing demands within the total framework of a sound fiscal policy, the Congress, as well as the executive branch, has responsibility for the exercise of judgment. Therefore, even though I disagree in this instance with the manner in which that judgment has been exercised, I do not feel that I should withhold my approval of this bill.

A nucleus of the Committee began meeting in September, but the membership was not completed until November. Formal announcement of the establishment of the Committee was made by Senator Hill on October 6, 1959 with the membership as follows:

BOISFEUILLET JONES, *Chairman*
Vice President and Administrator of Health Services, Emory University, Atlanta, Ga.

ALFRED BLALOCK, M.D.
Professor and Chairman, Department of Surgery, Johns Hopkins University Medical School, Baltimore, Md.

VIRGINIA G. S. BURNHAM
Vice President, Connecticut Manufacturing Co., Inc., Waterbury; Greenwich, Conn.

MICHAEL E. DE BAKEY, M.D.
Professor and Chairman, Department of Surgery, Baylor University College of Medicine, Houston, Tex.

EDWARD DEMPSEY, Ph. D.
Dean, Washington University School of Medicine, St. Louis, Mo.

SIDNEY FARBER, M.D.
Professor of Pathology, Harvard Medical School; Director of Research, Children's Cancer Research Foundation, Boston, Mass.

HARRY LYONS, D.D.S.
Dean, School of Dentistry, Medical College of Virginia, Richmond, Va.

LEO RIGLER, M.D.
Visiting Professor of Radiology, University of California Medical School at Los Angeles; Executive Director, Cedars of Lebanon Hospital, Los Angeles, Calif.

DAVID SARNOFF, Brig. Gen. (USAR)
Chairman of the Board, Radio Corp. of America, New York, N.Y.

CORNELIUS H. TRAEGER, M.D.
Professor of Clinical Medicine, Cornell University Medical School, New York, N.Y.

J. WALTER WILSON, Ph. D.
Professor and Chairman, Department of Biology, Brown University, Providence, R.I.

CECIL WITTSON, M.D.
Professor and Chairman, Department of Neurology and Psychiatry, University of Nebraska School of Medicine, Omaha, Nebr.

Dr. Margaret H. Sloan was granted leave of absence from the National Academy of Sciences-National Research Council to serve as staff director for the study. Mrs. Cecil M. Wootton was also granted leave from the National Academy of Sciences-National Research Council to serve as executive secretary, and Mrs. Bernice H. Storrer was loaned by the National Institutes of Health to fill the role of staff assistant.

The Committee was not selected to represent any particular groups, agencies or organizations. Of the twelve Committee members, nine are medical scientists and three are informed laymen, and the staff director is a physician with nongovernmental medical administrative experience. All of the members have served at one time or another as consultants and advisers in various aspects of the Government's research program and have shared the responsibility of seeing that the funds for research and training supplied by the Federal Government were utilized to maximum effectiveness. Each has a full-time occupation independent of the Government.

Most of the members have had service on study sections or advisory councils of the National Institutes of Health and therefore could bring to bear on the deliberations of the Committee a considerable knowledge of National Institutes of Health policies, operating procedures, and research program. Collectively, they were able to evaluate the total Federal program in support of medical research from personal experience in three different relationships: (1) as research investigators applying to the Federal Government for support; (2) as members of committees, study sections, or councils advising on matters of policy and evaluating the applications of others; (3) as members of the administration or the academic faculties of medical schools or universities responsible for teaching, the fostering of research in their departments and, in the case of members of clinical services, also responsible for patient care. One

member who had not had previous association with the National Institutes of Health contributed a thorough understanding of the problems of research and of research investigators in the electronics field, which seems destined to make enormous contributions to the instrumentation for medical research in the future. He was, therefore, able to take a fresh and very objective view of the Federal program of medical research against the background of his own experience in Government and industry.

The Committee met on alternate weekends from October 1959 until February 1960 and devoted March and April to the preparation of a report. It proved impossible to complete the hearing of witnesses before the end of January and, in consideration of the magnitude of the task assigned, the date for submission of the report was extended to May 1960.

The members examined a wealth of information available from many sources and specific data gathered at the Committee's request. Of particular interest and value were the reports of two other consultant groups which have recently made related studies:

U.S. Department of Health, Education, and Welfare, Office of the Secretary. *The Advancement of Medical Research and Education Through the Department of Health, Education, and Welfare: Final Report of the Secretary's Consultants on Medical Research and Education, 1958* (The Bayne-Jones Report).

U.S. Department of Health, Education, and Welfare, Public Health Service. *Physicians for a Growing America: Report of the Surgeon General's Consultant Group on Medical Education, 1959* (The Bane Report).

A partial list of the documents reviewed in the course of this survey can be found in the bibliography.

Over 100 experts in various fields of medicine, public health, education, and related activities presented testimony before the Committee during the course of these meetings. The Committee would like to express its sincere appreciation for the willingness of these witnesses to devote time and thought to this endeavor and for the valuable and pertinent information they presented. This report does not reflect the views of individual witnesses, but their collective testimony was extremely helpful to the Committee in its deliberations.

On the basis of the testimony of this outstanding group of witnesses, a study of the reports of earlier survey committees and of the massive body of pertinent data available, a review of the programs of the National Institutes of Health and of other Federal agencies supporting medical research, and long discussion both within and outside the scheduled meetings of the group, the members of the Committee of Consultants on Medical Research reached conclusions and made recommendations by unanimous agreement.

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